



DETECTION & CONTROL OF INVASIVE SPECIES IN MAUI COUNTY
HAWAII INVASIVE SPECIES COUNCIL
FINAL REPORT – FY23



Coqui crew filling spray tanks before evening operations



INTRODUCTION

HISC funding supported field work and outreach activities on Maui and Molokai on a suite of invasive species that threaten Maui County's watersheds, biological diversity, agriculture, and quality of life.

The Maui Invasive Species Committee (MISC) and Molokai/Maui Invasive Species Committee (MoMISC) are projects of the University of Hawai'i—Pacific Cooperative Studies Unit (UH-PCSU). Other key partners involved in the projects include the County of Maui, Hawai'i Department of Land and Natural Resources, Hawai'i Department of Agriculture (HDOA), Hawai'i Ant Lab, The Nature Conservancy, US Department of Agriculture, Haleakalā National Park, and community members.

Key objectives included:

A. Invasive Species Targets

1. Detect and control little fire ants (LFA) to ensure island-wide eradication.
2. Eliminate or reduce coqui frog populations on Maui.
3. Conduct early detection / rapid response actions on Maui and Molokai.
4. Target a suite of high-priority plant species for island-wide or local eradication.

B. Outreach and Education

1. Foster public awareness and concern about invasive species.
2. Maintain or increase public and private support for MISC and MoMISC programs.
3. Increase awareness of biosecurity and invasive species issues.
4. Participate in statewide invasive species outreach projects.

C. Data Collection and Management

1. Improve data management.
2. Assess coqui frog acoustic monitoring system.

Highlights: Early detection work focused on species not believed to be established on the islands. Survey and control work targeted 25 invasive plant species, five invertebrates, including one marine species, and two vertebrate species. Ground and aerial surveys covered approximately 21,745 acres and removed more than 34,464 plants.

A. INVASIVE SPECIES TARGETS: ACCOMPLISHMENTS

1. Detect and control little fire ants (LFA) for island-wide eradication.

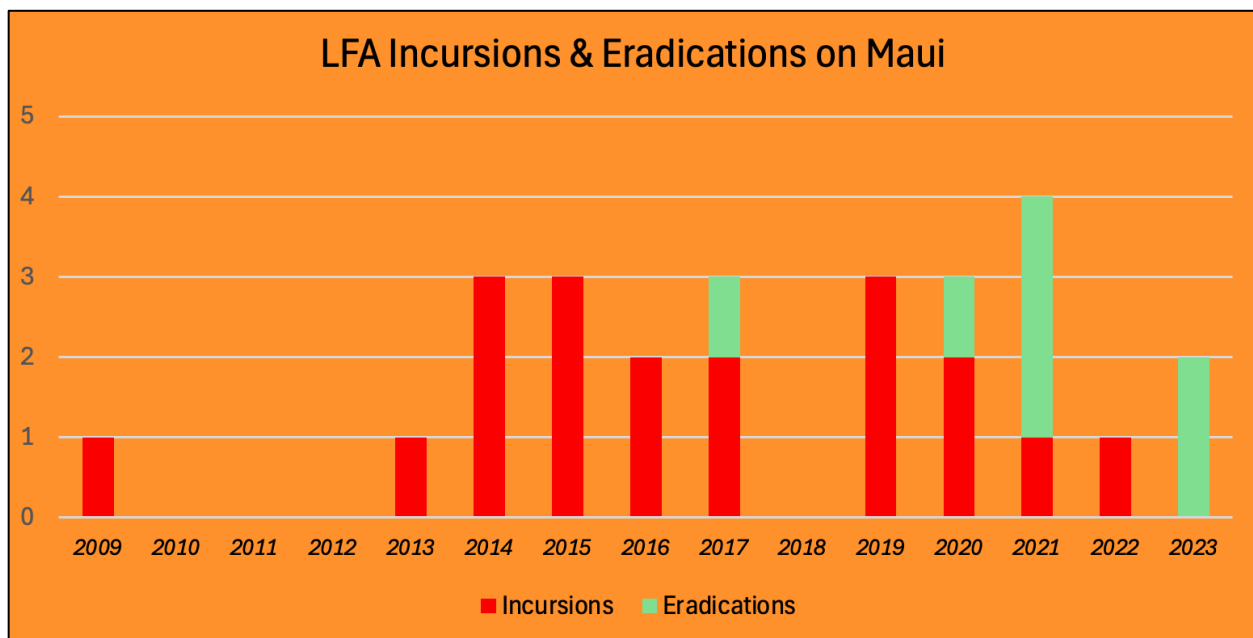
The goal for little fire ants (LFA) is to prevent the island-wide establishment of little fire ants on Maui. Early detection of new infestations is critical, along with prompt and consistent treatment and effective monitoring. MISC responded to all reports of suspect little fire ants, continued treatments at all known infestations, and concluded that LFA had been eradicated from two more sites on Maui.

Response to reports of suspect ants

- Detailed public interactions: MISC staff had 130 one-on-one interactions with members of the public. Interactions were often by email; responses often included biological and natural history information about Maui's ants. MISC also provided voicemail responses, which were not included in the tally.
- Suspect-LFA reports: MISC received 48 reports from the public about ants suspected of being little fire ants. None were determined to be LFA.
- Public surveys and ant submissions: A total of 70 home-survey kits were requested via the [StoptheAnt](#) website. Community members conducted 135 surveys for little fire ants and submitted 452 samples (peanut butter-baited sticks or vials). All samples were inspected, and any ants collected were identified; no LFA were detected. MISC staff informed all reporters about the results of their samples, including ant species present.

Number of new sites detected: No new little fire ant sites were detected, either through surveys or public reports. The cumulative number of incursions since 2009 remained at 19 (Figure 1).

Figure 1. History of incursions and eradications on Maui, 2009-2023



Implement eradication strategies at all known infestations: Relevant statistics include:

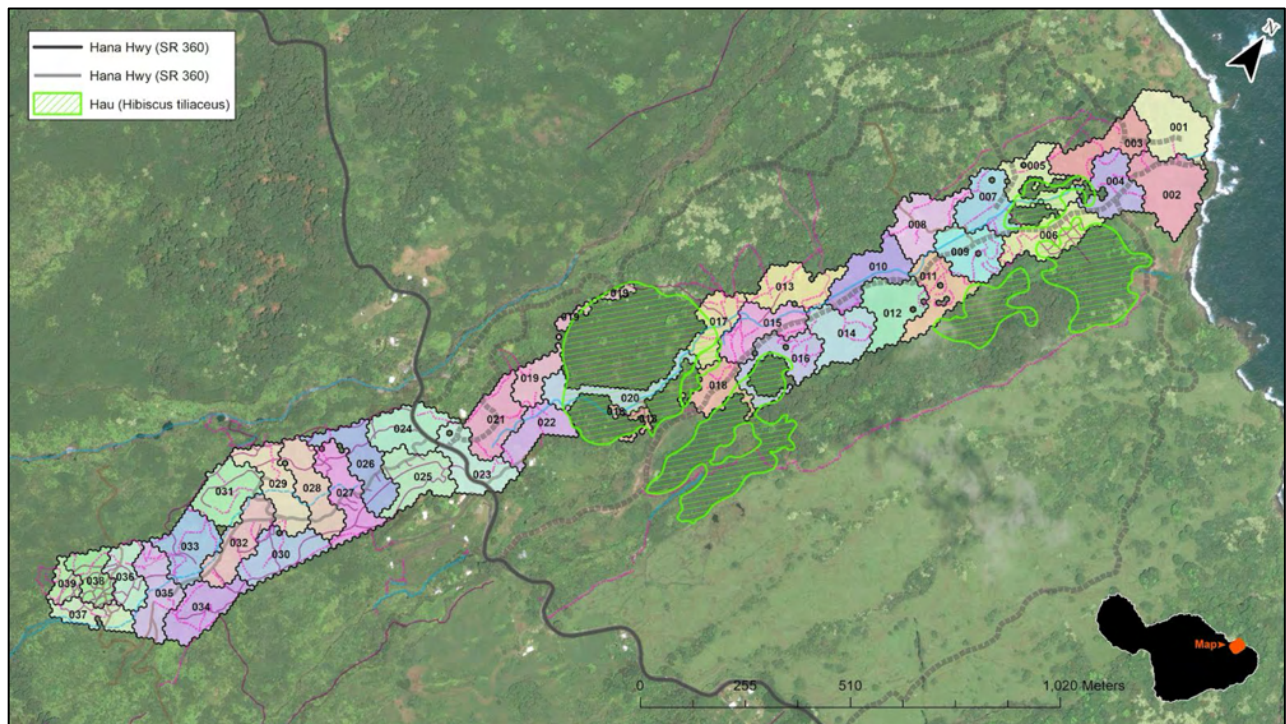
- Total area under management: 248 acres
- Area surveyed: 175+ acres
- Area treated: 291 acres
- Number of vials or traps deployed by MISC: 29,363

Treatment: Staff continued with surveys and treatments at the eight sites where little fire ants are still known to be present. Several locations have persistent “hot spots” or “breaches,” which involve the discovery of LFA in new areas connected to a known site.

Nāhiku infestation: First discovered in 2014, this 175-acre site on Maui's north shore has been the focus of aerial control using an insect growth-regulator since 2019. Two aerial treatments occurred in early 2023, followed by two targeted “hot spot” surveys that focused on the few areas known to still have ants. The first of the two surveys returned only one vial with LFA present—and it contained only three ants. The second survey turned up no little fire ants, and aerial treatments were subsequently suspended.

In October 2023, MISC conducted a third full-site “blitz” survey of the Nāhiku infestation a (Figure 2). Thirty-four surveyors worked 285 person-days, placing over 5,000 sample vials. Most vials were empty; more than 1,000 captured 23 different species of ants; none were LFA. The presence of so many ant species recolonizing the area suggests that little fire ants may actually be gone. This preliminary finding was quite extraordinary, marking the first time little fire ants have been reduced to below-detectable levels via aerial treatment using a non-toxic pesticide.

Figure 2. Survey grid for Nāhiku blitz



New strategies: MISC continued to explore innovative approaches, including use of a giant sling shot to treat a coconut palms (Figure 3). MISC staff also worked with Ryan Perroy and Roberto Rodriguez from UH Hilo's Spatial Data Analysis and Visualization Lab (SDAV) to conduct a trial use of MISC's drone to treat an LFA-infested area in Waihe'e Valley (Figure 4).

Figure 3. Slingshot practice



Figure 4. Using the MISC drone at Waihe'e Valley

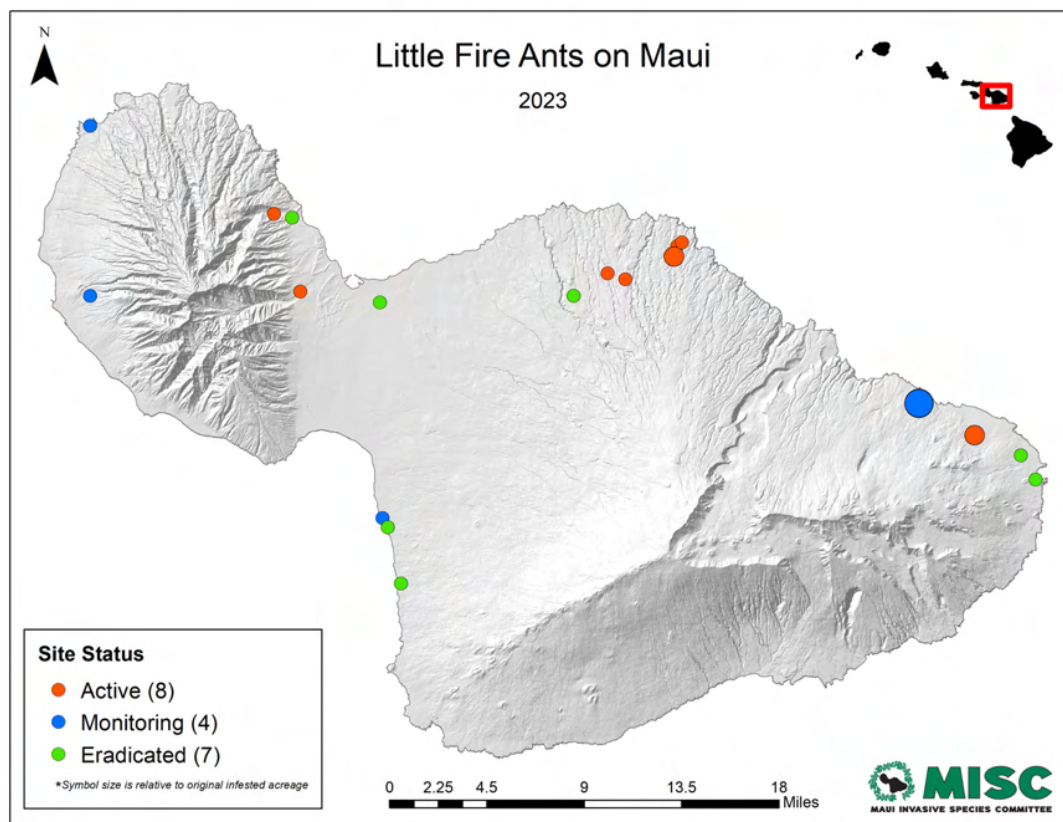


Current status of LFA on Maui

Since 2009, 19 incursions of little fire ants have been detected on Maui (Figure 5):

- Active treatment: 8
- Monitoring: 4
- Eradicated: 7

Figure 5. Status of little fire ant infestations on Maui



Eradications: During 2023, two more sites reached the five-year mark with no LFA detected and were declared eradicated. One of those sites, located in Waihe'e, was the first one ever detected on Maui. The site was previously considered eradicated, but a few pockets of ants had persisted undetected, extending the time and effort needed to finally clear the property. The other site, in Ha'ikū, was established by the movement of logs and wood from an LFA-infested property in Huelo that was owned by the same family.

Monitoring: Surveys continued at the four monitoring sites, where LFA are not currently known to be present, with no detections.

LFA Outreach and education: Most new locations are discovered by residents, making public awareness and motivation to report suspect ants critical for success. MISC shared LFA updates locally and at professional meetings, including the Hawai'i Conservation Conference (Figure 6).

Figure 6. Updates, with levity, on Maui's LFA project, at the Hawai'i Conservation Conference



Based on interactions with the public, the Maui community exhibits a relatively high degree of awareness regarding the threat posed by little fire ants and a high degree of support for our efforts (Figure 7).

Opportunities to increase understanding remain. The Ka'elekū infestation in Hāna experienced some public relations challenges. One property owner declined to allow access to her property for control, preferring to explore the (unproven) use of a *Metarhizium* fungus as a biopesticide, with production to be developed by a tenant. Many emails were exchanged and MISC worked with Maui County Councilmember Sinenci's office to schedule a public meeting, where lively discussions occurred. A follow-up article was published in the *Hanaside News*. MISC staff remains hopeful that by working cooperatively with the landowner, direct control will eventually be possible.

During the annual “Spot the Ant” month, MISC and MoMISC collaborated with the Hawai‘i Invasive Species Council and other partners to focus awareness on little fire ants. The extra outreach apparently reached the younger audience on Maui as one of the island’s keiki found little fire ants to be so scary she chose to be one for Halloween (Figure 8.) More outreach activities are detailed in the Outreach section.

Figure 7. Messages from ant sample submitters

Thank you very much for the detailed explanation.
I'm very happy that they're not the invasive ones! – Anton

Thank you so much! Really appreciate this service and we'll repeat periodically to help stay on top of the little fire ant problem. – Zach

I appreciate you attaching this additional information. I love citizen science stuff and it was cool to participate. Thanks for all you do for Maui and Hawaii! – Colleen

Thank you for your assistance in identifying this problematic ant and offering a potential solution to eradicate them from our property. I will continue to monitor the ant species around our property should the Little Fire Ant find its way here. – Meryl

Thank you for providing so much helpful information about my ant sample! I also appreciate the extra info you provided to help manage their population around my house. – Annalea

Figure 8. A not-so-tiny little fire ant

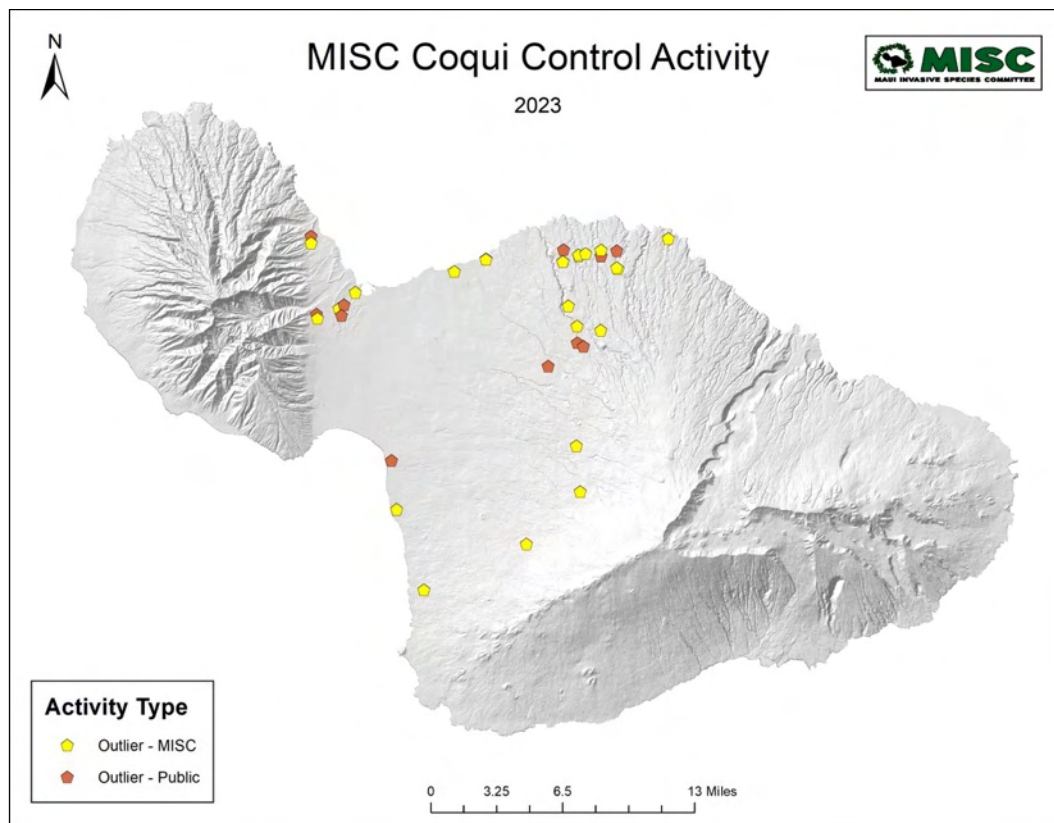


2. Eliminate or reduce coqui frog populations on Maui.

Coqui frogs are established in residential areas, small gulches, and throughout Māliko gulch on Maui’s north shore. The primary objectives included removing coqui from small outlier infestations; eradicating satellite populations where feasible; containing and reducing infestation levels in the Ha’ikū area; and supporting and growing the community coqui control program.

Outliers: Outliers are locations that have only a few coqui present and are outside the main infestation in Ha’ikū. MISC received reports by phone, email, social media, an online form, and through the statewide, online [643-PEST](#) reporting system. Staff conducted initial assessments to determine the validity and location of each report. Response actions typically included hand-capturing frogs and, if needed, spraying the area with a citric acid solution. At some locations, staff offered guidance on how to control the frogs, and the resident was able to successfully follow up. Coqui frogs were eliminated at 41 sites across the island (Figure 9).

Figure 9. Control of outlier coqui frogs - 2023



Satellite populations: Satellite populations have more than five calling coqui frogs, which are assumed to be reproducing. Since MISC first began controlling coqui, a total of 25 populations have been eradicated (more than one year since last calling frog was heard). MISC conducted field operations in each of the 16 current satellite populations. Four sites were in a monitoring stage at the end of the year, meaning no coqui were currently heard, and nine populations were under active treatment. Two new satellite populations were identified in Ha'ikū and were successfully suppressed. Including those two, five sites were on track to be eradicated in 2024.

A few sites are more problematic, including several nurseries. MISC hopes to create a position that would focus on the landscape industry, and work with state and county agencies to address the continued reintroduction of coqui through this pathway.

Reduce or contain infestations at targeted management areas: Staff conducted field operations in 37 different management units and worked at more than 114 different sites. Work included night-time surveys, spraying a 14-16% citric acid solution from trailered tanks, and habitat work (Figures 10-11). Management units that received intensive effort included the Kauhikoa, Lanikai, Giggle Hill, Honokala, and Ha'ikū cannery areas (Figure 12). Staff surveyed 4,356 acres for coqui and treated 154 acres. Habitat work focused on 15 acres. Staff applied 128,448 gallons of citric acid solution during treatment operations.

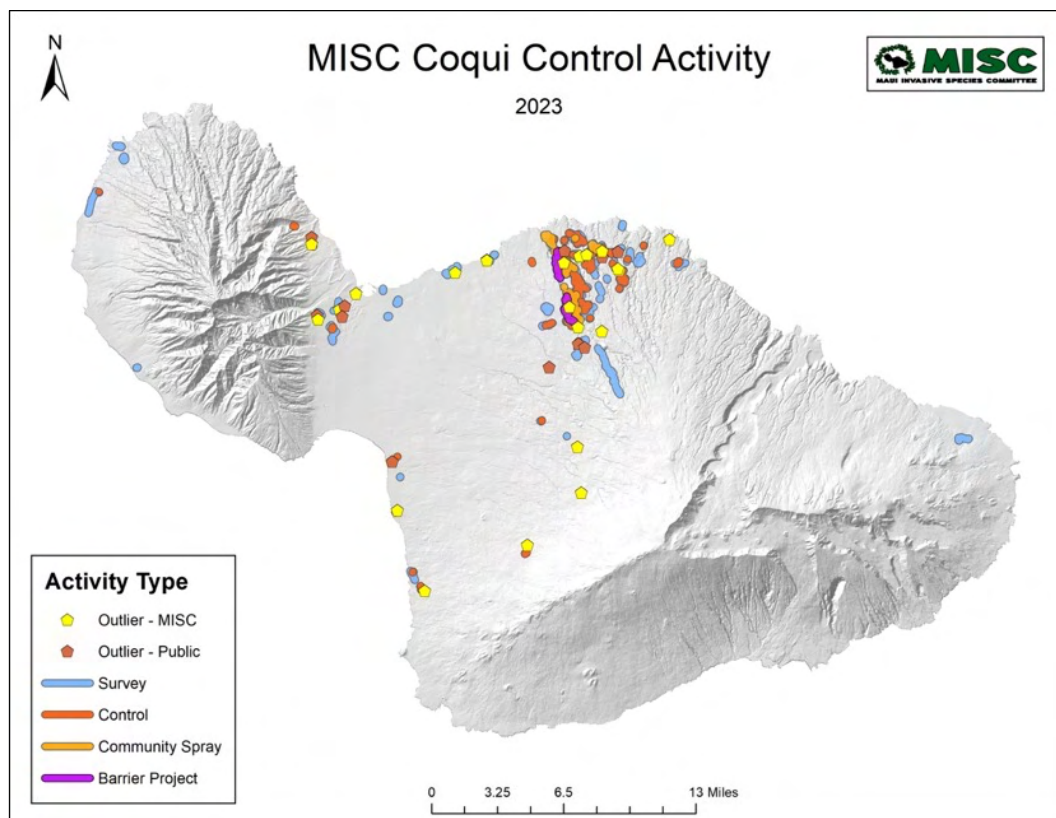
Figure 10. Night-time spray operations



Figure 11. Hauling fire hoses to prep for work



Figure 12. Coqui control actions on Maui - 2023



Coqui community control: The number of community groups controlling coqui frogs in their own neighborhoods continued to increase; ten groups are now active in the following areas: Lower Kokomo, Ha'ikū Town Acres, Ha'ikū Hill, Ha'ikū Makai, Cannery Mauka, Ha'ikū Mauka, Upper Kokomo, Oili, Lower Kauhikoa, and Pe'ahi (Figure 13). MISC staff continued to promote the community spray program to different neighborhood areas.

Some groups are mostly self-sufficient and have a group “captain” who works directly with MISC to obtain supplies and equipment. MISC recognized captain Terry Tolman as Maui County’s HISC 2023 “Community Hero” for his leadership with the Lower Kokomo community group (Figure 14). Other groups require more assistance during spray operations. MISC also works with smaller groups of neighbors who participate in control operations but in a less structured way. MISC’s coqui liaisons establish a schedule for spray operations, which typically occur over several nights during a week.

A total of 44 spray-weeks took place in 2023. MISC staff assisted with operations during 34 spray weeks, while the independent groups accomplished 10 spray-weeks on their own. Community members logged 398 hours. Community-based activities treated an estimated 120 acres. Coqui liaisons assisted with operations on 94 acres. The total amount of citric acid solution applied in the community areas (with and without direct assistance) was 58,420 gallons. MISC also provided 4,512 pounds of citric acid to the community.

Figure 13. Control operations conducted by community coqui control groups

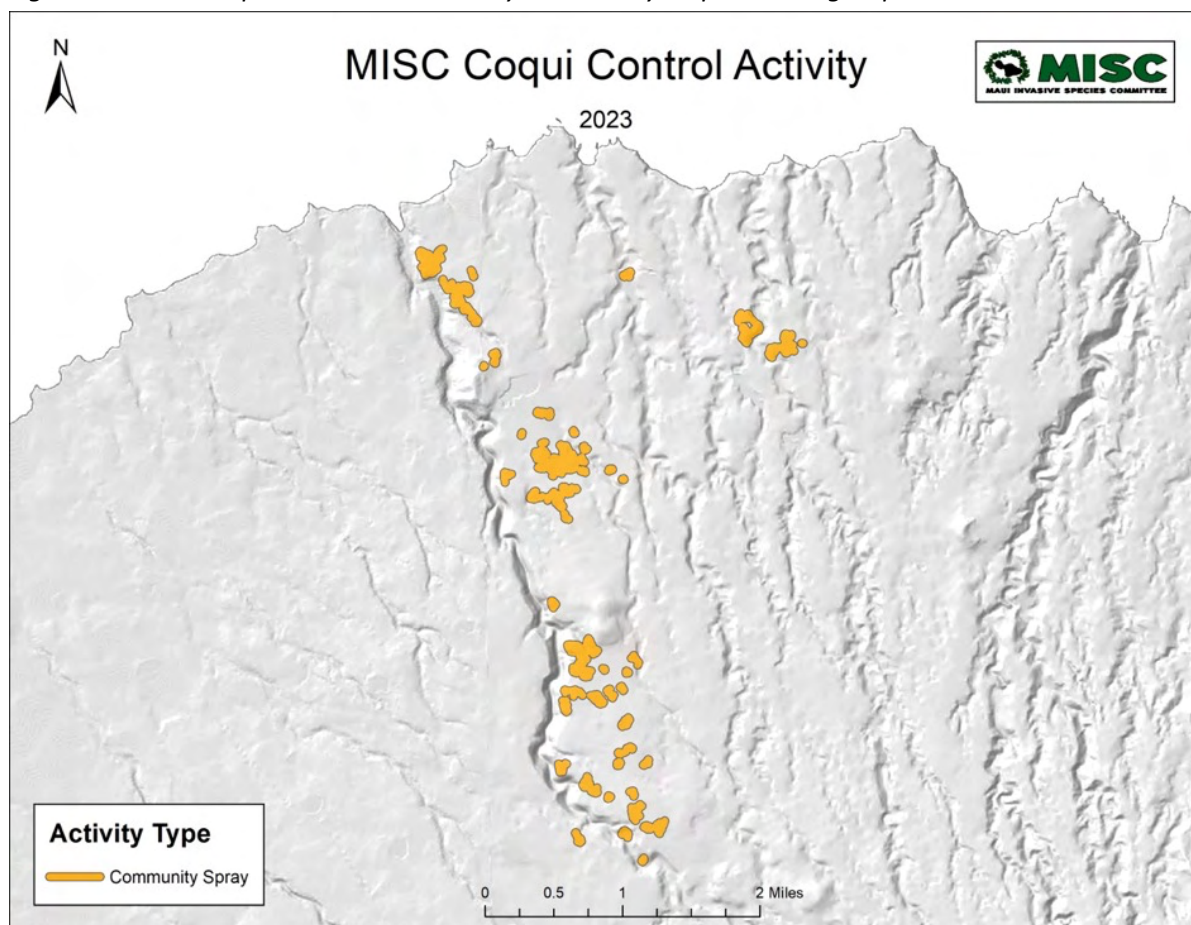


Figure 14. Terry Tolman receives “Community Hero” award—while picking up coqui supplies



Barrier fence: This separately-funded project is intended to limit spread from heavily-infested gulches. A brochure was developed to help explain the project to community members (Figure 15). In late 2023, a private contractor began clearing vegetation and installing barrier fence segments along portions of Māliko gulch (Figure 16). This project has a dedicated staff member who coordinates with the community, the contractor to ensure that project guidelines are being met. Accomplishments include:

- Vegetation clearing completed for 1,645 feet.
- Barrier fences completed at three sites, covering approximately 1,116 feet.
- Total planned installation: approximately 3 miles.

Figure 15. Coqui barrier brochure



Figure 16. A section of installed barrier fence



After prevention, the most cost-effective response to invasive species is early detection and rapid response. Activities included surveys for five invertebrate species (including LFA on Molokai), one plant pathogen, one marine species, and two vertebrate species (including coqui on Molokai). MISC and MoMISC worked with partner agencies on response actions for naio thrips and coconut rhinoceros beetle.

Nursery survey: Staff conducted one survey for invasive plants at an upcountry nursery with no “high risk” plants identified using ratings under the Hawai’i Pacific Weed Risk Assessment.

***Naio thrips (Klambothrips myopori)*:** This sap-sucking insect feeds on native naio (*Myoporum sandwicense*), weakening and eventually killing the plant. This pest has become established on Hawai'i Island and O'ahu. On Maui, MISC staff conducted surveys at 17 different locations and inspected 303 plants, with no detections (Figure 17). In late December, naio thrips were confirmed to be present on Molokai (Figure 18).

Figure 17. Naio thrips survey at Mākena



Figure 18. Naio thrips damage on Molokai



Coconut rhinoceros beetle (*Oryctes rhinoceros*): The coconut rhinoceros beetle was first detected on O‘ahu in 2013. Despite extensive control efforts, it subsequently spread across much of the island. The O‘ahu strategy shifted to focusing on stopping spread to other islands. In addition to airport surveys, MISC staff looked for CRB-type on palm trees at multiple locations around the island (Figure 19). From January to April, staff examined more than 5,500 palm trees, mostly focused on South Maui (Table 1), with no detections.

Figure 19. CRB survey at Kahului Harbor



Table 1. CRB surveys, Jan-April 2023

Locations	Palm trees
Central Maui	598
Keopuolani Park	54
Wailuku	190
Kahului Harbor	354
South Maui	3,685
Maluaka	80
Cove Park, Kamaole I & II	252
Kalama Park	196
Kealia Pond	9
Lipoa	674
Makena Landing	417
North Kihei Residential	252
Palauea	395
South Kihei Road	600
Wailea Golf Club	235
Wailea Mauka	500
Waipuilani Park	75
West Maui	1,176
Launiupoko Beach Park	60
Wahikuli Wayside Park	120
Front Street	394
Maalaea	334
Mala Wharf	176
Olowalu	92
East Maui	103
Kaupo	103
Total	5,562

By the fall of 2023, CRB had been detected on Kaua'i (June) and Hawai'i Island (October). In November 2023, CRB larvae were reported from a golf course in South Maui. The following day, after training by HISC Pest Report Facilitator Elizabeth Speith, MISC launched a survey of palms within a two-mile radius of the initial site (Figure 20). Staff created a CRB-specific form, building on the existing NRDS data collection system. Survey data included the species, location, and presence/absence of any CRB damage for each tree observed.

Staff surveyed over 26,500 palm plants, mostly coconut palms, and photographed any suspect CRB damage (Figure 21). Only 117 trees showed cut leaf, dead crowns, or boreholes. Keith Weiser, Deputy Incident Commander with the CRB Response team, reviewed the images; he ranked more than 70% as showing no symptoms, approximately 25% as low probability, and only one plant as suspect. After conducting field observations, it was determined that the other suspect plant was not indicative of CRB.

MISC conducted surveys at locations around the island, most intensively near the original infestation (Figures 22 and 23). No new infestations were discovered, which meant the origin of CRB and any other CRB locations on Maui remained unknown. The earlier CRB surveys and the thorough surveys in South Maui immediately following the detection provides hope that CRB is not yet widely established on Maui.

Figure 20. MISC team and HISC Pest Report Facilitator—ready for CRB surveys.



Figure 21. Palm tree types recorded during surveys on Maui, November-December 2023

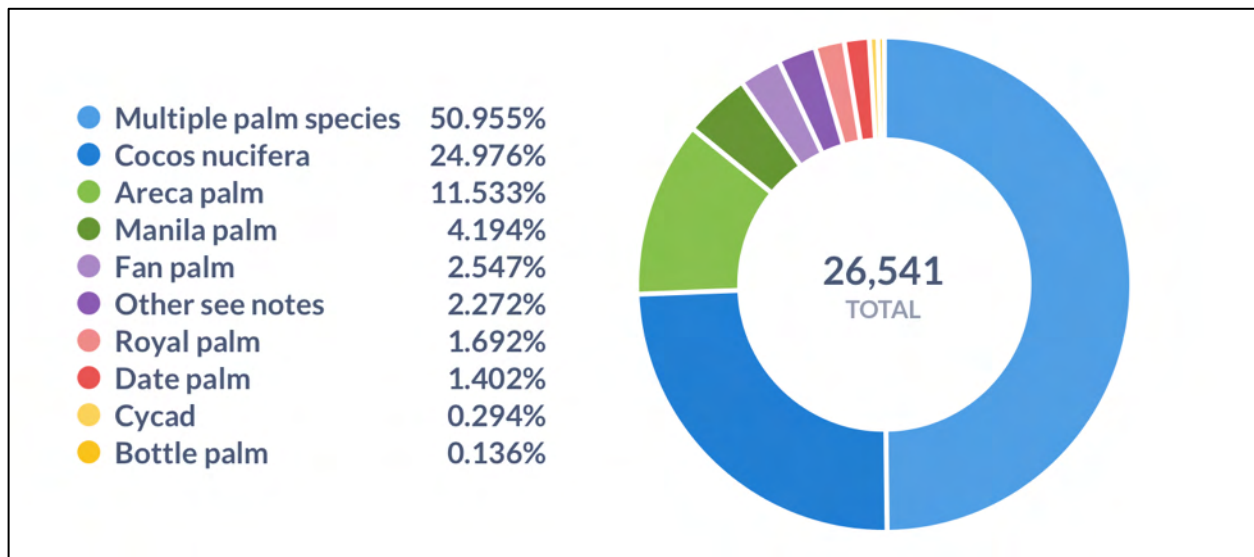


Figure 22. Palm survey locations, November-December 2023

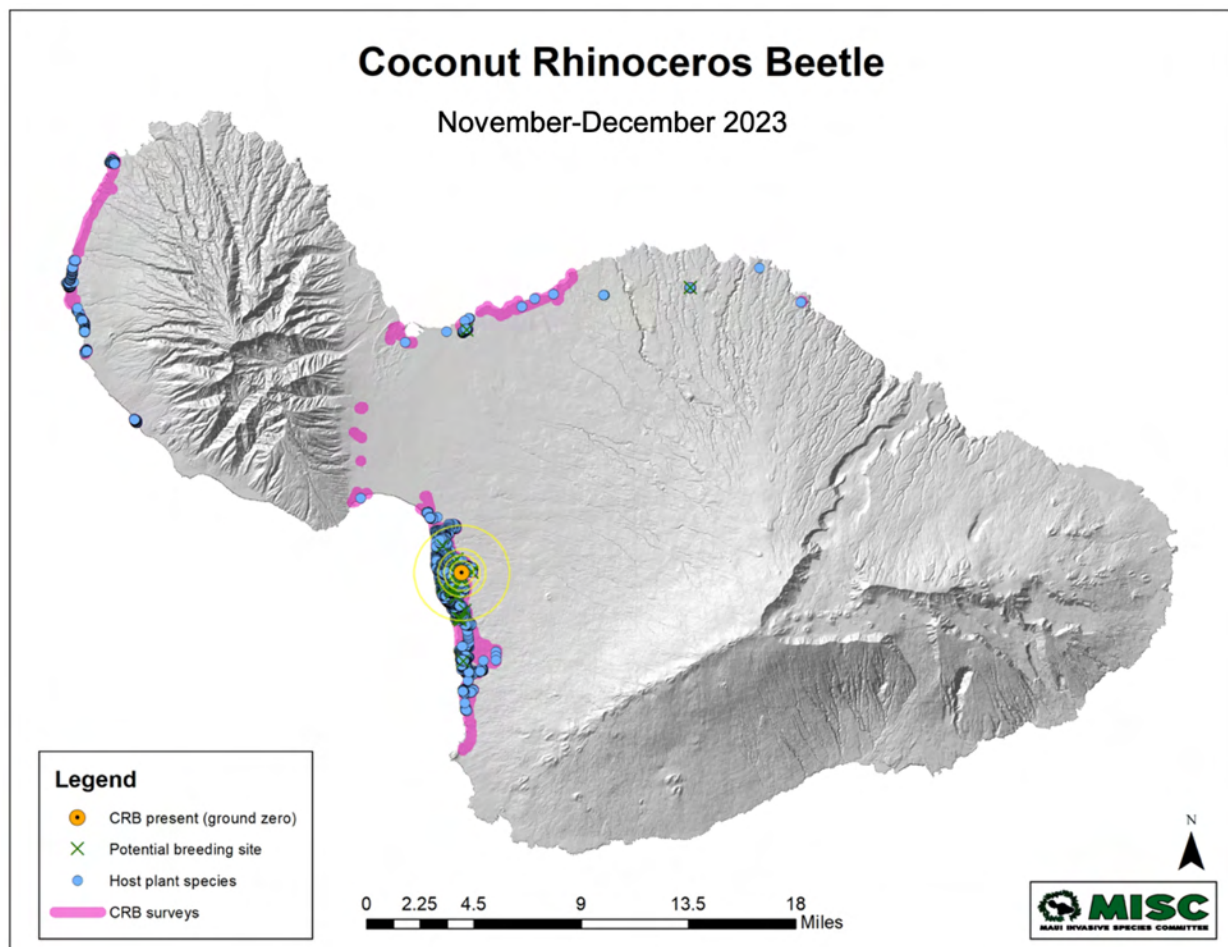
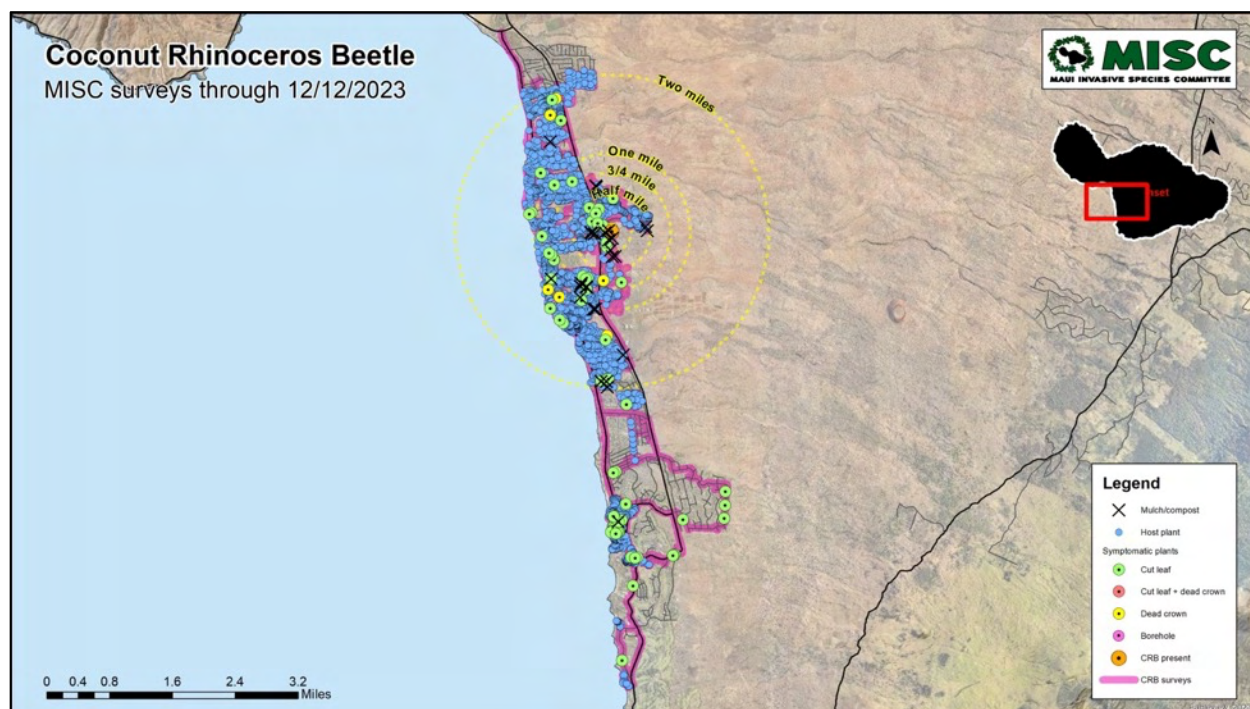


Figure 23. CRB surveys near the initial detection



Rapid 'Ōhi'a Death (*Ceratocystis lukuohia* and *C. huliohia*): MISC staff participated in statewide efforts to protect native 'ōhi'a trees from the fungal disease known as ROD. Staff responded to five reports of suspect trees (2 locations in Pukalani, 2 in Kula, and 1 in Wailuku), and sent samples to the US Department of Agriculture lab in Hilo. No ROD was detected on Maui or Molokai during this time period.

Molokai EDRR surveys: In addition to airport surveys, MoMISC staff conducted surveys at locations across the island for one marine species, two invertebrate pests, and one vertebrate, with no detections (Table 2).

Table 2. EDRR surveys on Molokai

Common name	Latin name	Acres surveyed
Upside-down jellyfish	<i>Cassiopea andromeda</i>	62
Coconut rhinoceros beetle	<i>Oryctes rhinoceros</i>	181
Little fire ant	<i>Wasmannia auropunctata</i>	387
Coqui frog	<i>Eleutherodactylus coqui</i>	243

4. Detect and target high-priority species.

Maui: Survey and control results are shown in Table 3 and Figures 28 and 29.

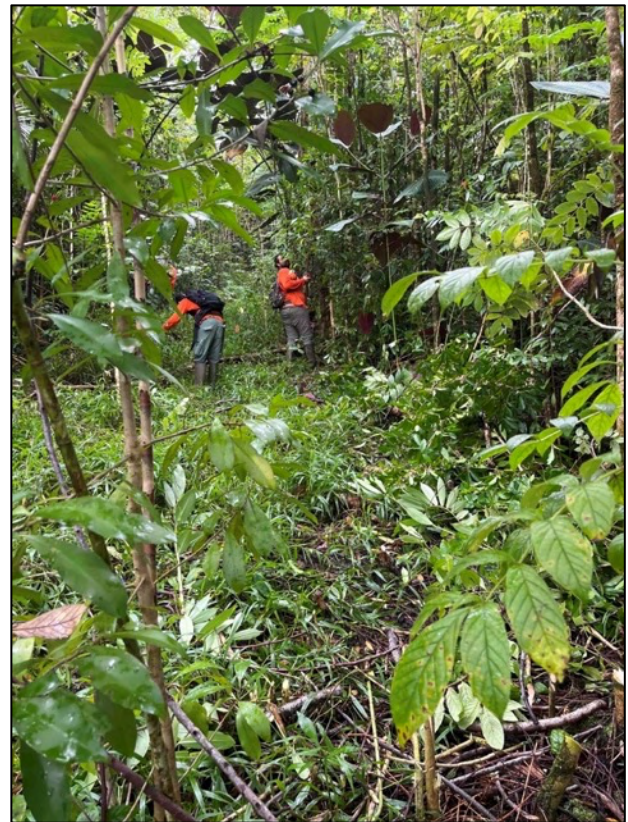
Miconia (*Miconia calvescens*): Miconia is one of the most invasive and ecosystem-modifying of all tropical weed species. It is a challenging target due to its production of abundant seeds, seed longevity (20 years or more), and access challenges for ground crews (Figure 24). Miconia had gained a strong foothold in lower-elevation forests of East Maui before it was discovered, making eradication unlikely. Recent surveys have determined that mature and near-mature plants continue to establish in outlier areas, including portions of Haleakalā National Park. The overall strategy is containment—preventing its domination of native forests and its spread to West Maui. Efforts focused on finding and removing miconia plants in the lower-elevation, non-native forests of East Maui. Operations covered 5,729 acres and removed 30,846 miconia plants, of which 6,754 were mature (Figures 28 and 29).

Ground operations: The Hāna crew responded to public reports, and surveyed 150-meter road buffers along the Hāna Highway to prevent the spread of miconia via vehicles. Staff covered 834 acres, including portions of Hāna Ranch, and other areas of East Maui, out to Ke‘ānae. The crew removed 6,746 mature plants (Figure 29). East Maui Irrigation helped facilitate a survey in Huelo along a portion of Waipio Stream to identify miconia locations and evaluate access options. The Hāna team also worked to clear old roads in the Hāna core area and cut trail to Kawaipapa Stream, work that will pay off later with easier access to higher-elevation areas. Challenging conditions included working in areas with many mature trees and more frequent-than-usual stormy weather.

Aerial operations: Aerial reconnaissance and control operations covered 4,895 acres and controlled 33 immature plants. Aerial survey and control operations concentrated on areas mauka of the known infestations, including the Waimoku Falls area on the southeast flank of Haleakalā, and the western extent of the miconia infestation, mauka of the Twin Falls area (Figure 28).

Miconia research: MISC continued working with Ryan Perroy and Roberto Rodriguez from the UH SDAV Lab on development of a helicopter-based remote-imagery platform to survey miconia in East Maui. The final product is expected to be extremely helpful for prioritizing ground and aerial operations. MISC also remains hopeful that an effective biocontrol agent will be available in the next several years to help slow the spread of this aggressive invader.

Figure 24. Hāna crew tackling tall miconia trees



Molokai: Ground and road surveys by the MoMISC crew covered 1,222 acres and helped confirm that miconia has not gained a foothold in the East Molokai watershed.

Pampas grass (Cortaderia jubata and C. selloana): Pampas grass is a large, tussock-forming grass native to South America, with plants that produce thousands of wind-dispersed seeds. Two *Cortaderia* species occur on Maui; both have proven to be aggressive invaders in natural areas of California, New Zealand, and South Africa. Pampas grass has taken root in the rain forests of East Maui, and on the steep faces of Mauna Kahālāwai. Progress on curtailing pampas grass in East Maui has been substantial, but the species has continued to spread in remote, inaccessible portions of West Maui. Ground and aerial operations covered 7,580 acres, including 162 acres by ground and 7,418 acres by air (Figure 28). These operations removed 2,963 pampas grass plants, including 1,376 that were mature (Figure 29).

Ground operations: The plant crew conducted ground survey and control operations in residential areas, ranchlands, forested areas of East Maui. The crew uses geospatially-created buffers around known plants to establish survey areas. Survey areas included portions of Polipoli and Haleakalā Ranch. Upcountry ranches continued to be supportive and cooperative for survey and control operations. Ground operations covered 162 acres and removed 183 pampas grass plants, including 16 mature plants.

Aerial operations: Aerial surveys also use the buffer system to establish survey areas. These surveys included portions of the East Maui watershed where MISC had previously conducted extensive ground-based work, including Honomanu and ranchlands. Low numbers of plants were detected during, suggesting that control efforts have been successful. Aerial treatment occurs during summer and fall months when mature plants are more visible. Surveys covered 7,418 acres and removed 2,780 plants, with the vast majority of these from West Maui, where a total of 2,704 pampas plants were controlled, including 1,296 mature plants (Figure 25). MISC worked collaboratively with the Mauna Kahālāwai Watershed Partnership on aerial operations.

Figure 25. View from the helicopter—pampas grass plants visible on a West Maui wall



Ivy gourd (*Coccinia grandis*): Ivy gourd is a rapidly-spreading perennial vine in the cucumber family that smothers vegetation, and spreads vegetatively and by seed dispersal. Ivy gourd seeds remain dormant for years, flowering after a heavy rain. Ivy gourd sites are located in Waiehu, Kīhei, Kapalua, and Ha'ikū, and include residential properties, golf courses, an agricultural site, and a few semi-rural locations. MISC conducted survey and control operations at all known locations, covering 120 acres. A total of 539 plants were removed, including 136 mature plants.

Fountain grass (*Cenchrus setaceus*): Fountain grass is an early colonizer of lava fields and dry forests, and readily adapts to disturbed areas. This species is on target for eradication on Maui and likely has been eradicated from Molokai. No fountain grass plants were detected at a site in Pukalani. Surveys at the Pu'u o Kali site early in the year detected two immature plants which were removed. Access issues frustrated impeded subsequent visits.

Other species: Staff conducted surveys for rubber vine (*Cryptostegia grandiflora*), Spanish heath (*Erica lusitanica*), and Jerusalem thorn (*Pereskia aculeata*) with low numbers detected and controlled (Figure 26 and Table 3).

Figure 26. Rubber vine in Kīhei



Molokai: MoMISC conducted survey and control work on 18 invasive plant species (Figure 27). Surveys covered 8,314 acres and control operations removed 101 plants (see Table 3 and Figures 30 and 31). Only seven of the species targeted had plants controlled, underscoring that most species are in a monitoring phase and on track for eradication. MoMISC also conducted roadside surveys for eight different species: pampas grass, rubber vine, kahili ginger, parasol leaf tree, miconia, New Zealand flax, long-thorn kiawe, and gorse.

Figure 27. MoMISC staff conducting field surveys



Table 3. Invasive Plant Survey & Control Operations – Maui and Molokai

Maui Target Species			
Common Name	Latin Name	Acres	Plants
Fountain grass	<i>Cenchrus setaceus</i>	<1	2
Ivy gourd	<i>Coccinia grandis</i>	120	539
Pampas grass	<i>Cortaderia spp.</i>	7,580	2,963
Rubber vine	<i>Cryptostegia madagascariensis</i>	<1	6
Spanish heath	<i>Erica lusitanica</i>	2	6
Miconia	<i>Miconia calvenscens</i>	5,729	30,846
Jerusalem thorn	<i>Pereskia aculeata</i>	<1	1
	Subtotal Maui Species	13,431	34,363
Molokai Target Species			
Common Name	Latin Name	Acres	Plants
Quail bush	<i>Atriplex lentiformis</i>	13	0
Cat's claw	<i>Caesalpinia decapetala</i>	36	0
Pampas grass	<i>Cortaderia jubata</i>	1,270	0
Rubber vine	<i>Cryptostegia madagascariensis</i>	211	4
Australian tree fern	<i>Cyathea cooperi</i>	8	1
Bo tree	<i>Ficus religiosa</i>	<1	0
Kahili ginger	<i>Hedychium gardnerianum</i>	1,260	0
Parasol leaf tree	<i>Macaranga tanarius</i>	226	0
Wood rose	<i>Merremia tuberosa</i>	1	8
Miconia	<i>Miconia calvenscens</i>	1,222	0
Malabar chestnut	<i>Pachira aquatica</i>	<1	73
Barbados gooseberry	<i>Pereskia aculeata</i>	93	0
New Zealand flax	<i>Phormium tenax</i>	1,263	0
Long-thorn kiawe	<i>Prosopis juliflora</i>	1,457	4
Multifloral rose	<i>Rosa multiflora</i>	2	5
Palm grass	<i>Setaria palmiflora</i>	1	0
Cup of Gold vine	<i>Solandra maxima</i>	1	6
Gorse	<i>Ulex europaeus</i>	1,250	0
	Subtotal Molokai Species	8,314	101
Total		21,745	34,464

Figure 28. Invasive plant surveys on Maui

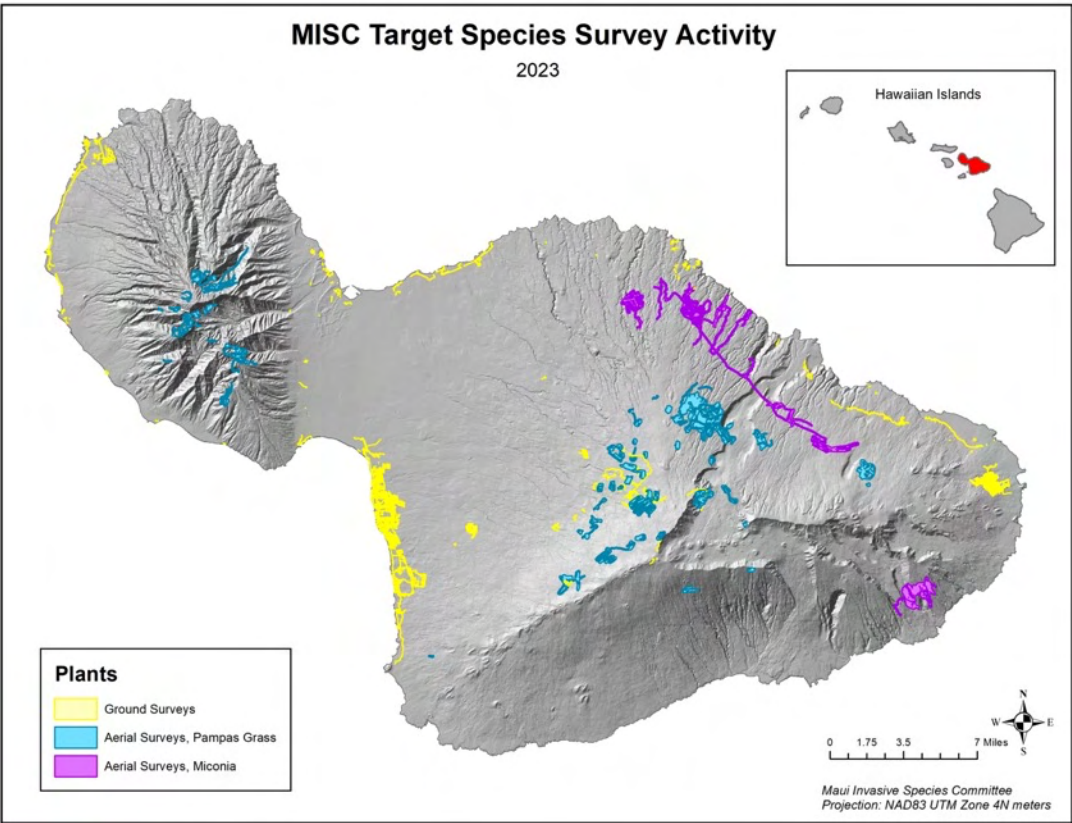


Figure 29. Invasive plant control on Maui

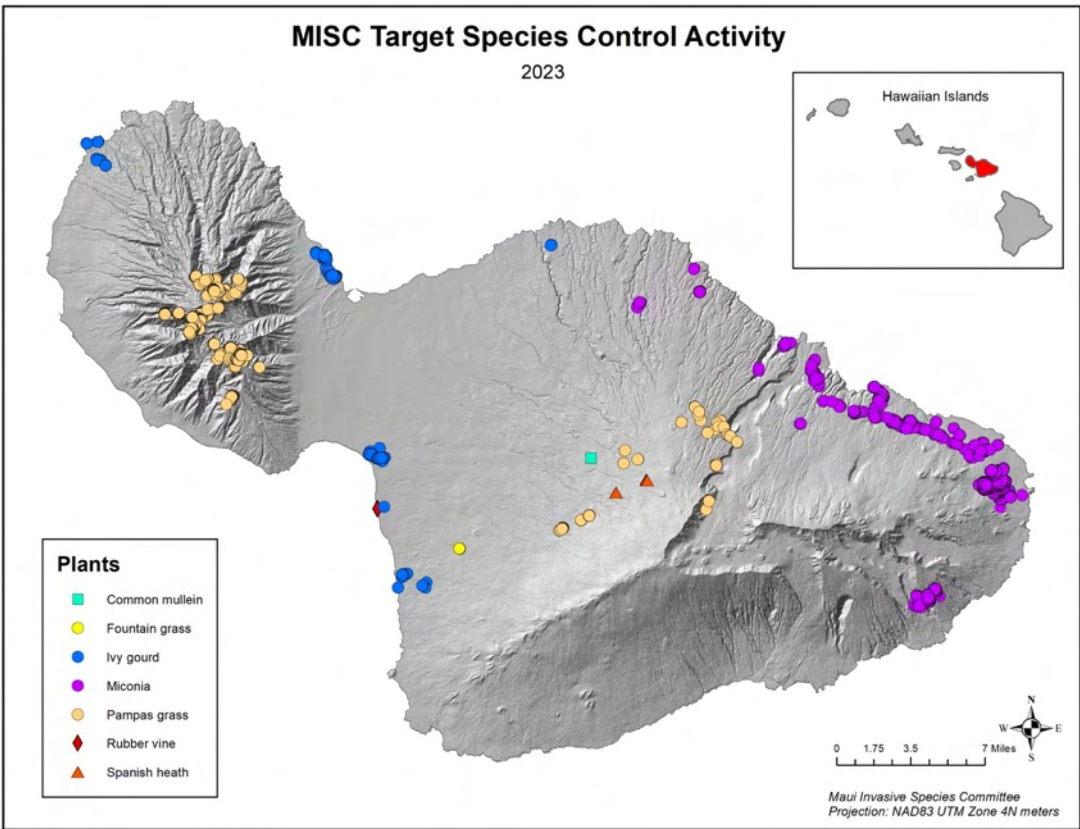


Figure 30. Invasive plant surveys on Molokai

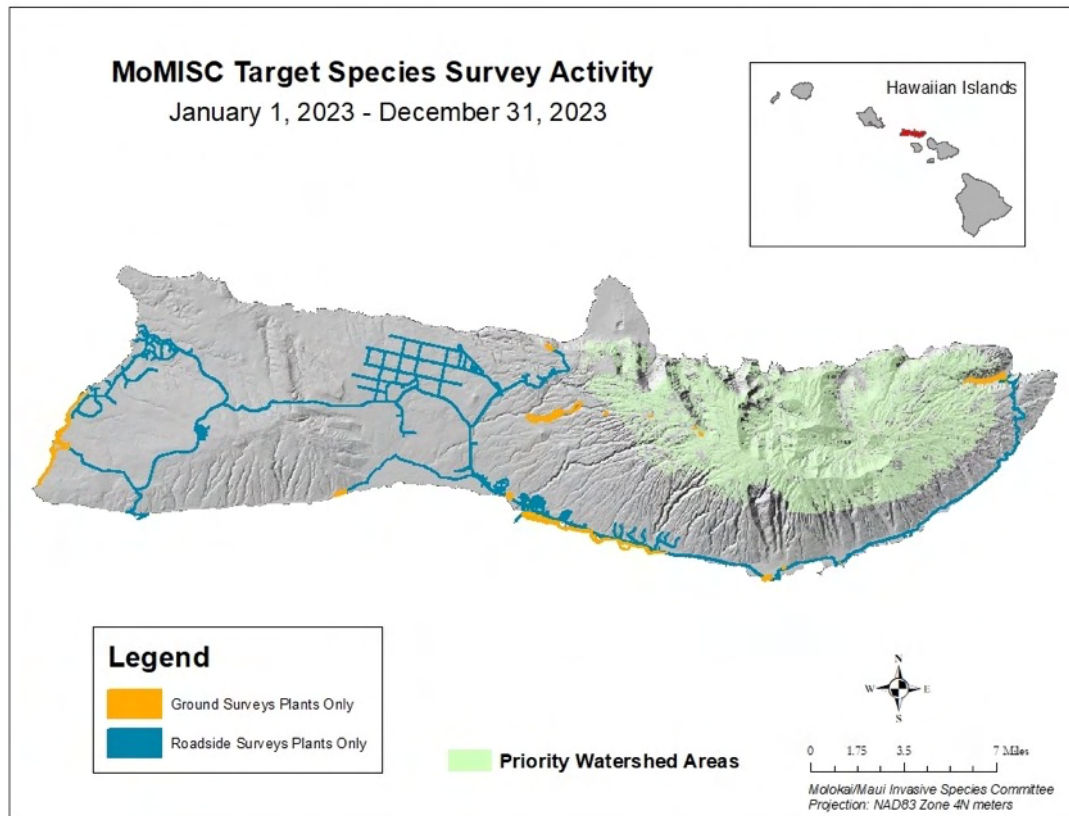
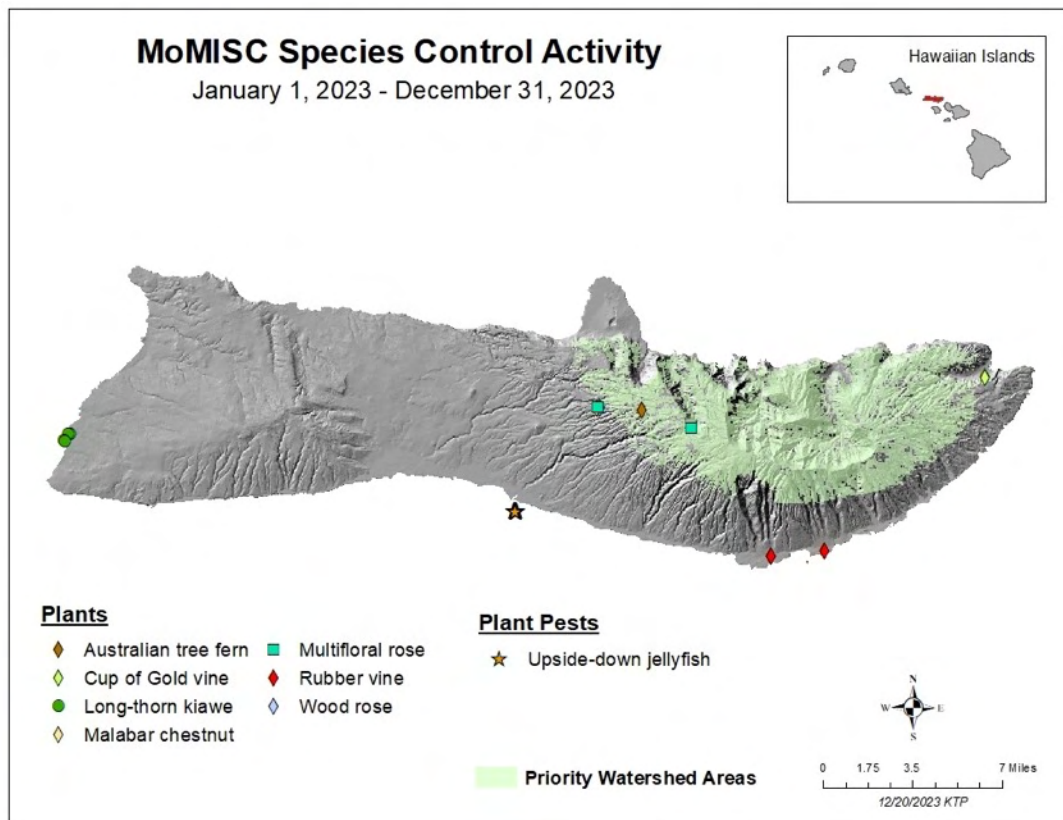


Figure 31. Invasive plant control work on Molokai



Invasive vertebrates

- Rabbits: MISC responded to two reports of loose rabbits on Maui and removed two animals. The priority for response to feral rabbits is for those in close proximity to natural areas.
- Mitred conures: MISC still does not have access to the location where the population of mitred conures is located. Ten conures were observed during one survey
- Rose-ringed parakeets: First detected on Maui in the 2021, the most birds ever observed was 12 individuals. During surveys in 2023, three birds were observed but no opportunities were available for control. The parakeets are located in the Napili area of West Maui, where access was challenging after the Lahaina fire. Renewed efforts for control are anticipated for 2024.

B. OUTREACH AND EDUCATION

The key objectives for invasive species-related outreach and education included:

1. Fostering public awareness and concern
2. Maintaining or increasing public and private support.
3. Increasing awareness of biosecurity and invasive species issues.
4. Participating in statewide outreach projects.

Outreach and education activities focused on these objectives using a variety of strategies. MISC and MoMISC activities reached 57,565 people through local print/online media, at least 300,000 through local broadcasts, and more than 1,000,000 through the international coverage of the Maui fires. Staff engaged directly with an estimated 2,937 adults and students through outreach events, workshops, presentations, and classroom visits (Figure 32). An active online presence helped promote messaging about invasive species, with more than 219,416 views.

Outreach topics, venues and media approaches were diverse (Tables 4 and 5). Topics included the suite of MISC and MoMISC targets, and always included little fire ants, coqui frogs, and miconia. Workshops included trainings for tour guides using the Maui-Mauka Conservation Awareness materials, and teacher workshops utilized the Hō'ike o Haleakalā curriculum. Landscape industry activities included articles or presentations about best management practices and the annual award given to a member of the landscape industry.

Figure 32. Teacher workshop, playing "Win, lose, adapt"



Table 4. Outreach and education activities by topic and category - 2023

	Media or Forum Type							Totals
	Print/online	Mail	Broadcast	Event	Presentation	Workshop	Classroom	
General Topics	20	0	1	2	1	6	15	45
Biocontrol	1						2	3
Biodiversity	2						6	8
Biosecurity	1							1
Conservation careers	2			1			2	5
Fire	8		1					9
Landscape industry	1			1	1	6		9
Watersheds	2						5	7
Workshop	3							3
Target species	16	1	9	5	3	8	55	97
Coqui	1							1
CRB	4		1					5
Invasives	2		2	4	1	8	49	66
LFA	7	1	6		2		2	18
Plants	1			1			1	3
ROD							3	3
Veiled chameleon	1							1
Totals	36	1	10	7	4	14	70	142

Table 5. Outreach activity and reach

Activity Type	Number	Reach
Print/online	36	57,565
Mail	1	6,048
Broadcast	10	54,128
Event	7	546
Presentation	4	305
Workshop	14	211
Classroom	70	1,875
Grand Total	142	120,678

Invasive grasses: The devastating fires in Lahaina and Kula shone a bright light on the relationship between invasive grasses and a warming climate. In the midst of staff responding to the tragedy on a personal level and simultaneously providing on-the-ground fire-fighting assistance to upcountry residents, MISC fielded multiple calls each day from national and international media outlets who were trying to piece together stories and angles about the root cause of the fires (Figure 33). MISC staff rose to the occasion, especially MISC's PR and Education Specialist, who had returned to Maui and her former position only days before the fires erupted. MISC's response benefited greatly from the knowledge and expertise of staff from the Hawai'i Wildfire Management Organization and other natural resource professionals in Hawai'i.

Fire related articles included:

- [Invasive plants brought to Maui by colonists helped fuel the wildfires](#), *Time Magazine*.
- [How invasive plants caused the Maui fires to rage](#), *New York Times*
- [Fast-growing and fire-resistant grasses are flourishing In Hawai'i](#), *Civil Beat*

Figure 33. New York Times article on invasives and fire



- [In fire-stricken Maui, sustainable land management is key](#), *Modern Farmer*
- [Hawaii's wildfire aftermath](#), *Carbon Brief*
- [How invasive grasses could have contributed to the magnitude of Maui's fires](#), *Hawai'i Public Radio*

Little fire ants: MISC participated in the annual LFA statewide outreach effort during October to raise awareness about the threat of little fire ants. Radio PSAs aired on KPOA and KISS for 30-to-33 times per week over five weeks. Flyers were mailed to residents of windward communities to encourage them to submit ant samples, and reached over 6,000 residents in Waihe'e, Wailuku, Ha'ikū, Huelo, and along the Hāna Highway to Hāna.

LFA-related articles and interviews:

- [All-hands-on-deck effort to find little fire ants in Nāhiku](#), *Maui News*
- [Hawai'i residents can help stop the spread of invasive ants](#), *Lahaina News*
- [Scientists appear to be winning a battle against little fire ants in East Maui](#), *Hawaii Public Radio "The Conversation"*
- [A 175-acre little fire ant infestation on Maui reaches turning point](#), *Maui Now*
- [Eradication of little fire ants close on Maui](#), *UH News*
- [MISC: Eradication of little fire ants in Nāhiku now in sight](#), *Maui News*
- [Letter to Editor: Mahalo to MISC, Ant Lab in fight against little fire ant](#), *Maui News*
- [Moloka'i has no little fire ants. They want to keep it that way](#), *Hawaii Public Radio "The Conversation"*
- [Maui invasive species group deems remote area in Nāhiku free of little fire ants](#), *Hawaii Public Radio "The Conversation"*
- [Little fire ants hana hou](#), *Hawaii Public Radio "The Conversation"*
- [New strategy against little fire ants working on Maui](#), *Big Island Video News*

Print and online news media: Articles by and about MISC highlighted work conducted on Maui and Molokai, as well as statewide activities, including the Hawai'i Invasive Species Awareness Month (HISAM) and "Stop the Ant" month.

MISC's "Kia'i Moku" articles in the *Maui News* raised awareness about invasive species issues. Topics included coconut rhinoceros beetles, native birds, watersheds, invasive plants, little fire ants, wildfires, veiled chameleons and coqui frogs.

- [Prevention is key for Maui to stay coconut rhinoceros beetle free](#)
- [The race to protect Hawaii's native forest birds from extinction](#)
- [Is Ant Watching Really a Thing](#)
- [Protecting ohia: Fencing for the trees](#)
- [Shiny Leaves and Purple Flowers? Check that it's not a poisonous rubber vine](#)
- [Urban forests support resilience](#)
- [How the community helped eradicate a predatory chameleon years ago](#)
- [Stopping wildfires parallels containing invasive species](#)
- [Protecting place: How invasive species modify ecosystems](#)

- [All-hands-on-deck effort to find little fire ants in Nāhiku](#)
- [Prevention policies, community can stop coconut rhinoceros beetles](#)
- [Fencing for frogs; the effort to build a barrier to slow down coqui in Haiku is underway](#)

Events, presentations, and displays: MISC and MoMISC had tables or displays at 7 public events and gave 4 presentations or online webinars. Events included: Kamehameha Schools H'olaule'a, Maui Department of Agriculture Ag Resources Fair, Keiki Fun Day at Napili Park, Festivals of Aloha, "Pests in Paradise," hosted by the Western Chapter International Society of Arboriculture, Maui Huliau Career Exploration Event, and Arbor Day at the Maui Nui Botanical Garden. On Molokai, staff maintained an information kiosk at the airport. These events reached at least 546 individuals. MISC's ability to staff events was limited in part due to a gap in staffing and the Maui fires.

Landscape Industry: The annual Mālama i ka 'Āina Award recognizes a private citizen or business for helping prevent the spread of invasive species in Maui County. The award is co-sponsored by the County of Maui, the Maui Association of Landscape Professionals, and MISC. Becky Lau was the 2023 recipient (Figure 34). Becky was honored for her longstanding promotion of native plants, including coordination of native plantings at the Ha'ikū Elementary School and the Kahului Library, and for her insatiable commitment to weeding. The award plaque included a glass rendering of the native a'ali'i by glass artist Jupiter Nielsen on a koa plaque. The sculpture was inspired by the plant's resilience and importance for restoring native ecosystems.

Figure 34. Mālama i ka 'Āina award recipient Becky Lau



Workshops: MISC organized and/or collaborated with other partners on 14 workshops, including 2 teacher workshop on the Hō'ike curriculum, 6 pest prevention trainings, and 6 training events for tour guides with the Maui-Mauka Conservation Awareness Training program. These targeted activities reached 211 people.

Classroom visits: MISC staff made 70 classroom visits at 13 different schools. Lessons were based on activities from the Hō'ike o Haleakalā curriculum and involved 1,875 students (Figure 35). MISC field staff occasionally assisted with these activities to help make the connection between efforts to protect natural areas and potential careers in conservation.

Figure 35. Successful "snake hunt" at Maui Huliau's Career Exploration event



Online presence: Five different websites provided information and resources about MISC and MoMISC target species and programs ([MISC](#), [MoMISC](#), [LFA Spot-the-Ant](#), [Hō'ike o Haleakalā](#), and the [Maui-Mauka Conservation Awareness Training](#) program). MISC also maintained two social media platforms, [Instagram](#) and [Facebook](#), and a [YouTube channel](#) (Figure 36) and used email campaigns to keep the public informed about our work.

Figure 36. Instagram posts highlighting HISAM and a media interview with our Coqui Coordinator



C. DATA COLLECTION AND MANAGEMENT

Key objectives for this program element included improving data management and assessing the coqui frog acoustic monitoring system.

Data management improvements: MISC continued to work with the NRDS data management system. Familiarity with its functions allowed MISC's Data GIS-Invasive Ant Supervisor to quickly create a grid-based system for 25 staff to conduct thorough surveys in a residential area of Kīhei for coconut rhinoceros beetles, incorporate management of the coqui barrier fence project, and continue to make improvements for other target species. Like any data management system, there will always be improvements.

Acoustic monitoring: The contractor Conservation Metrics continued analyzing data from the acoustic monitors that were deployed in portions of the Ha'ikū-Māliko gulch infestation. The intent of the project is to provide an independent assessment of control efficacy. Staff made regular site visits to ensure proper functioning of the monitors and retrieve data cards.

D. CHALLENGES

Staffing: MISC was not immune to the post-pandemic economic impacts affecting many businesses in Hawai'i, where housing is limited and expensive; finding qualified workers to fill Pā'ia-based coqui and plant crew positions was challenging. MISC also had a major shift in talented staff as the long-time dynamic duo of Forest and Kim Starr opted to hang up

their early-detection sleuthing boots (Figure 37). Their dedication and extensive botanical and entomological knowledge will be sorely missed. MISC is evaluating the best path forward for early detection.

Figure 37. Forest and Kim Starr on Haleakalā – in silversword habitat



Partner funding: The Invasive Species Committees are successful in large part due to their ability to pool and leverage funding from different sources. MISC and MoMISC have benefited tremendously over the years from strong support from HISC and the County of Maui. The programs experienced significant challenges during 2023 due to county funding coming on line very late in the year, and continued uncertainty about county funding for FY24. These hurdles impacted work, staffing decisions, supplies acquisition, and overall morale. MISC and MoMISC are hopeful that FY25 will be a smoother year.

Maui Fires: The Lahaina and Kula fires in August 2023 changed the physical, emotional, and economic landscape on Maui. Everyone at MISC and MoMISC was affected in some way. In addition to the *kuleana* of responding to media inquiries and taking care of our own, MISC responded directly to the Kula fire using the tools, training, and equipment that form the core of our coqui spray operations. Given the option of taking administrative leave, every available staff person opted instead to spend their time working on hot spots (Figure 38). It was an honor to do so, deepening our ties to the community and underscoring the importance of the work we do.

Figure 38. MISC staff at the Kula fire



For more information about this project:

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Partner agencies and projects

