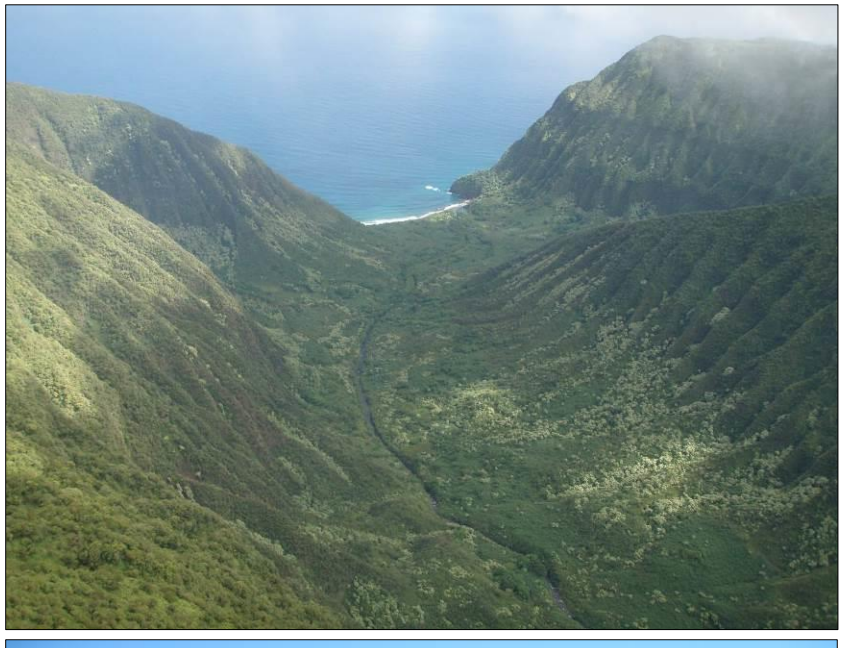
MoMISC
MOLOKA'I/MAUI INVASIVE SPECIES COMMITTEE

MISC
MAUI INVASIVE SPECIES COMMITTEE

DETECTION & CONTROL OF INVASIVE SPECIES IN MAUI COUNTY
HAWAI'I INVASIVE SPECIES COUNCIL
FINAL REPORT – FY15



INTRODUCTION & OVERVIEW

Invasive species threaten Maui County's life-giving watersheds, agricultural sustainability, extraordinary biological diversity, and quality of life. HISC funding was critical to the accomplishments outlined in this report. Survey and control operations focused on 54 invasive species, with work occurring on the ground and in the air, on state and federal land, private rural and residential properties, and agricultural lands and ranches. Work targeted 44 plant species, 4 vertebrates, 4 invertebrate pests, 1 plant disease, and 1 aquatic species, and controlled at least 42,961 plants, 1,000s of coqui frogs and little fire ants, and 1,295 banana trees for BBTV. Crews surveyed 37,557 acres and treated more than 403 acres. In all, work encompassed more than 10,422 hours, including 575 partner-contributed hours and over 216 volunteer hours.

TARGET SPECIES: DELIVERABLES & ACCOMPLISHMENTS

LITTLE FIRE ANTS

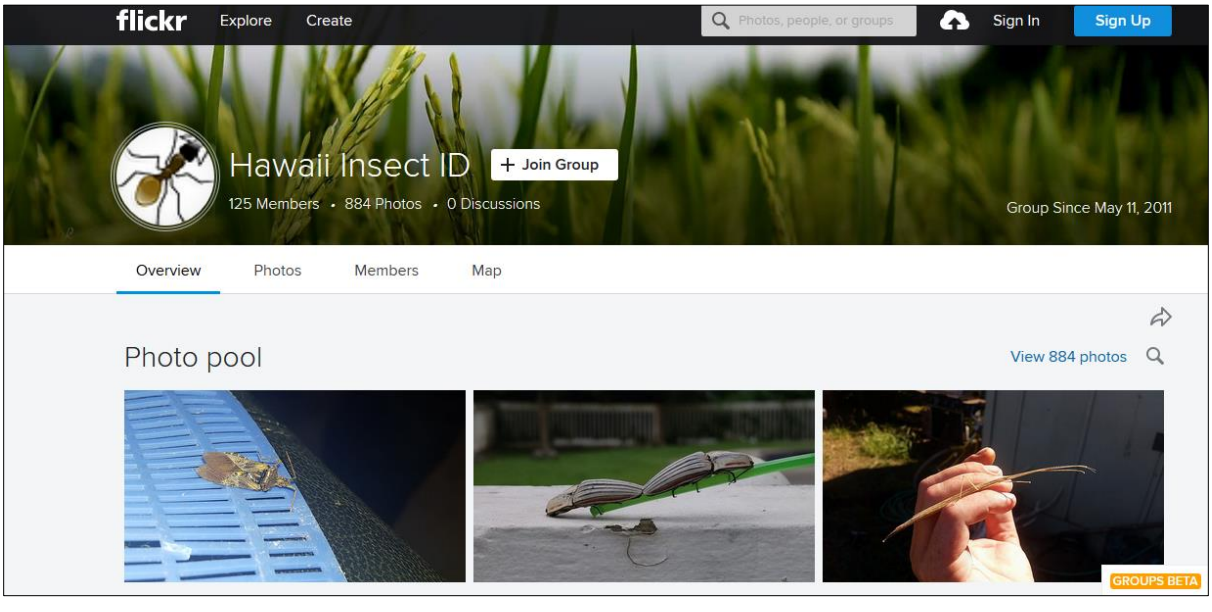
Deliverables: Launch detector dog project; conduct nursery surveys; control operations at new sites in partnership with Hawai'i Department of Agriculture (HDOA) and Hawai'i Ant Lab (HAL).
Accomplishments: MISC and MoMISC staff conducted LFA surveys over 775 acres, including door-to-door surveys across much of Hāna. The LFA detector dog program has been delayed due to contracting challenges and a focus on controlling known populations. At the close of the reporting period, Maui had three LFA infestations, including the largest site in the State under active control. See map on page 7 for locations. The Nāhiku site is expected to require control over more than 100 acres. Both the Nāhiku and Huelo sites are regularly treated by staff from HAL in cooperation with MISC and HDOA. MISC takes a lead role in working with landowners, conducting outreach, and managing data. A small infestation in South Maui is under treatment by the landscape manager. Numbers are declining at the South Maui and Huelo sites, but the ability to control all infested areas in Nāhiku is restricted by the presence of ants in waterways. Residents who are opposed to the use of pesticide treatments at both the Huelo and Nāhiku sites have further complicated progress.

Surveys for little fire ants

EDRR CAPACITY

Deliverables: Staff receive updated training on plant and vertebrate identification.

Accomplishments: Identification skills were reviewed during staff meetings and incorporated into requirements for advancement within the projects' staff progression series. MISC's Early Detection specialists reviewed literature on rapid 'ōhi'a death (ROD), coconut rhinoceros beetle (CRB) and naio thrips to help determine high-risk pathways, potential establishment sites, and methods to detect the species as early as possible. Staff responded to online identification requests from the public, including 346 related to plants and 157 on insects.



COCONUT RHINOCEROS BEETLE

Deliverables: Assist with U.S. Department of Agriculture (USDA) and HDOA CRB surveys as feasible.

Accomplishments: MISC's assistance was not needed at this time. CRB was included as a target species during roadside surveys on Maui. Staff also included information about CRB during outreach and education events.

CONTROL AND ERADICATION

The proposal identified specific deliverables for *Miconia calvescens* and *Cortaderia spp.*

Deliverables - **Miconia**: Conduct aerial operations on 10,000 acres; 1,000 acres by ground.

Accomplishments - **Miconia**: Aerial operations covered 12,987 acres; ground operations covered 734 acres; access was limited by dense *Clidemia* in areas of rose apple dieback. Outlier populations of miconia on Maui continued to decline using the herbicide application technology developed by James Leary, UH College of Tropical Agriculture and Human Resources.

Deliverables - **Pampas grass:** - Conduct aerial survey / control operations over 7,500 acres; cover 1,000 acres by ground.

Accomplishments - **Pampas grass**: Aerial operations covered 12,727 acres; ground operations covered 1,539 acres. Mature pampas grass plants declined in East Maui, while control of the West Maui population remained problematic due to terrain and access limitations.

Rappelling for miconia control in Huelo

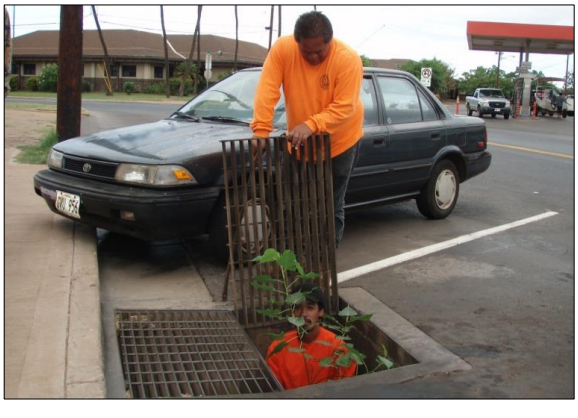
Pampas grass control in East Maui

OTHER INVASIVE SPECIES

Deliverables - **Plants:** Conduct survey and eradication operations for 25 invasive plant species (12 on Maui, 13 on Molokai).

Accomplishments - **Plants:** Targeted 44 invasive plant species (20 species on Maui, 24 on Molokai). See tables on pages 7-8, and maps on pages 10 and 12. The number of mature plants for most target species declined on both Maui and Molokai. Most target plant species on Molokai are at the seedbank depletion stage. Staff also conducted roadside surveys for 66 invasive plant species. On Kaho'olawe, MISC's EDRR specialists helped survey for new plants in high traffic areas; seven plant species previously not recorded from the island were collected.

Plant surveys on Molokai



Bo tree detection - Molokai

Deliverables - **Vertebrates:** Conduct survey and eradication operations for 4 invasive vertebrates (axis deer, mitred conure, veiled chameleon, and coqui frog). Respond to all new coqui frog reports; contain Māliko Gulch; conduct spray operations over 25 acres in Māliko Gulch area.

Accomplishments - **Vertebrates:** See page 6 for axis deer. No veiled chameleons have been detected on Maui since 2008; efforts focused on education and outreach to the affected community. No mitred conures were removed despite efforts to do so. Numbers are relatively stable at about 10-15 birds; future efforts will focus on removing the remaining individuals as feasible. Local residents are assisting with removal of the conures under Hawai'i Department of Land and Natural Resource (DLNR) depredation permits. MoMISC responded to reports of rabbits.

MISC's efforts on coqui frogs focused on responding to new reports across the island, but control of coqui frogs on Maui remained challenging. MISC worked to address all outlying populations and worked closely with local landowners in the Māliko Gulch area to help limit spread from the gulch. Despite these efforts, the Māliko gulch population continued to increase and spread out of the gulch into residential areas due to inadequate resources. Additional Maui County funding is expected to help address this gap. Staff treated approximately 194 acres for coqui frogs in the Māliko area. See map on page 11 for locations and infestation levels.

Coqui crew in action: habitat work & spray equipment

Deliverables -**Invertebrate Species/Plant Pests:** Conduct survey and eradication operations for 3 invertebrate pests (LFA, CRB, and naio thrips); 1 plant disease (BBTV), and 1 aquatic species (upside-down jellyfish). Conduct island-wide surveys for BBTV on Molokai and work to contain the virus on both islands.

Accomplishments - **Invertebrate Species/Plant Pests:** The EDRR roadside surveys included looking for signs for all three invertebrate pests. In addition to the work described above on LFA and CRB, MISC's Early Detection specialists compiled known information about naio plants on Maui to assist with ongoing monitoring for naio thrips. This work is in collaboration with DLNR and consistent with the statewide naio thrips plan. No naio thrips or CRB have been detected on Maui or Molokai.

BBTV remains restricted to one main area on Molokai; all known infested areas were surveyed and infected plants treated. The virus continues to spread on Maui, where more resources are needed to try and contain its spread. See maps on pages 11 and 12 for location and treatment activity on the two islands.

MoMISC conducted surveys over 32 acres for upside-down jellyfish; none were detected.

MISC and MoMISC staff also conducted surveys for four other invertebrate pests or plant diseases. On rapid ʻōhiʻa death, efforts included reviewing remote sensing imagery for signs of ROD in Maui Nui and noting any locations for future surveys. MISC staff also participated in the Maui-based ROD working group. On Molokai, staff assisted USDA and HDOA with surveys for coconut flower mite, hala scale, and *Erythrina* gall wasp.

Staff monitored and participated as feasible in development of the statewide Mamalu Poepoe project, which will increase surveys at the islands' ports and harbors. MoMISC continued to partner with USDA and HDOA on collecting and submitting unusual insects for identification and voucher specimens.

Aerial surveys for suspect ʻōhiʻa death: none found

COUNTY FUNDING

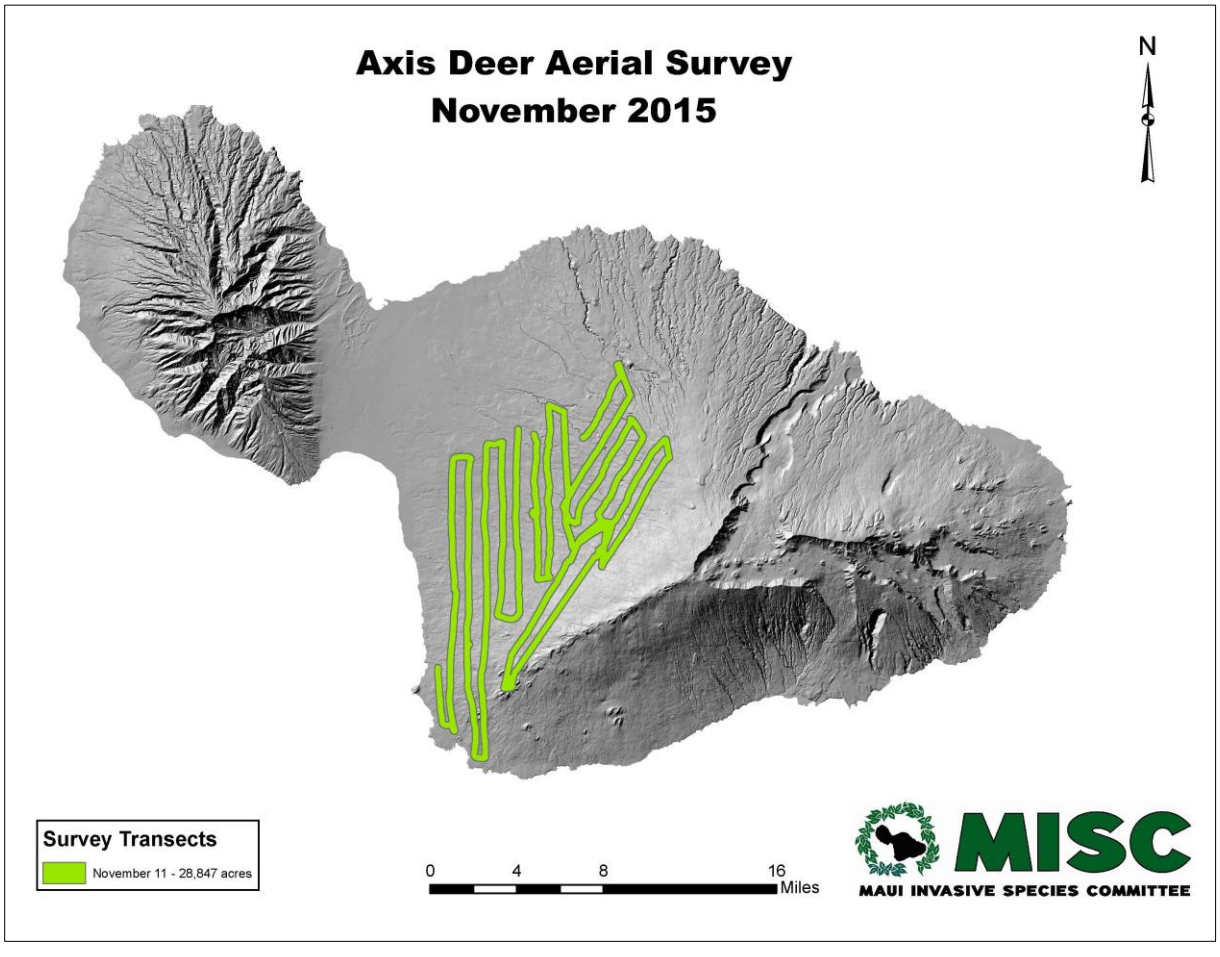
Deliverable: County funding levels maintained or increased.

Accomplishments: County funding increased by $1.2 million for coqui frogs.

WIDESPREAD VERTEBRATE PESTS

Deliverables: Implement axis deer management plan; refine population estimates using aerial surveys; radio collar 5 does for survival/mortality estimates; implement outreach campaign.

Accomplishments: MISC staff continued to work with the multi-stakeholder Axis Deer Working Group and with the Big Island Invasive Species deer program to explore options to reduce population numbers on Maui. Aerial surveys in upcountry and south Maui were conducted and initial analysis completed. The collaring program was delayed due to a County funding shortfall. This project again suffered a setback with the loss of personnel and uncertain funding.



CAPACITY FOR SNAKE SIGHTINGS

Deliverable: BTS refresher training for three staff.

Accomplishments: Three staff are scheduled for refresher training in 2016. MISC forwarded a snake call to HDOA and DLNR for further investigation (deemed non-credible).

COQUI FROGS ON STATE LANDS

Summarized above.

TARGET SPECIES WORK ON MAUI

			Acres	# of Plants Controlled			Hours
Taxon Name	Common Name	Island	Inventoried	Mature	Immature	Total	Total Hours
PLANTS							
Acacia podalyriifolia	Quensland Silver Wattle	Maui	2	-	-	-	0.1
Acacia retinoides	Water Wattle	Maui	0	-	-	-	0
Arundo donax	Giant Reed	Maui	28	-	-	-	4
Caesalpinia decapetala	Cat's Claw	Maui	10	2	219	221	19
Coccinia grandis	Ivy Gourd	Maui	1,178	61	2,528	2,589	398
Cortaderia	Pampas grass	Maui	14,267	648	2,095	2,743	2,049
Cryptostegia grandiflora	Rubber Vine	Maui	17	-	-	-	2
Erica lusitanica	Spanish Heath	Maui	10	1	-	1	2
Macaranga mappa	Bing a Bing	Maui	2	-	-	-	0
Macaranga tanarius	Parasol Leaf Tree	Maui	233	-	21	21	7
Maclura pomifera	Osage Orange	Maui	6	-	-	-	4
Miconia calvescens	Velvet Tree	Maui	13,721	1,696	27,380	29,076	2,919
Morella cerifera	Wax Myrtle	Maui	2	-	13	13	1
Pennisetum setaceum	Fountain Grass	Maui	237	-	5	5	136
Pereskia aculeata	Barbados Gooseberry	Maui	4	1	14	15	2
Pittosporum undulatum	Victorian Box	Maui	13	9	153	162	58
Pittosporum viridiflorum	Cape Pittosoporum	Maui	12	1	26	27	10
Rhodomyrtus tomentosa	Downy rose myrtle	Maui	1	-	-	-	2
Silybum marianum	Blessed Milk Thistle	Maui	57	-	-	-	21
Verbascum thapsus	Common Mullein	Maui	53	3	78	81	44
INVERTEBRATES							
Banana bunchy top virus	BBTV	Maui	11	-	-	876	122
Wasmannia auropunctata	Little fire ant	Maui	107	-	-	-	1,014
VERTEBRATES							
Mitrata mitrata	Mitred conure	Maui					12
Eleutherodactylus coqui	Coqui frog	Maui	-	-	-	-	1,104
	TOTALS		29,972	2,422	32,532	35,830	9,023

Pampas grass sweeps in upcountry Maui

TARGET SPECIES WORK ON MOLOKAI

			Acres	# of Plants Controlled			Hours
Taxon Name	Common Name	Island	Inventoried	Mature	Immature	Total	Total Hours
PLANTS							
Angiopteris evecta	Mule's foot fern	Molokai	40	117	216	333	103
Arundo donax	Giant reed	Molokai	6	-	-	-	11
Atriplex lentiformis	Quail bush	Molokai	358	73	490	563	24
Caesalpinia decapetala	Cat's claw	Molokai	82	19	388	407	39
Cortaderia jubata	Pampass grass	Molokai	1	-	-	-	3
Cryptostegia madagascariensis	Rubber vine	Molokai	588	2	6	8	58
Cyathea cooperi	Australian tree fern	Molokai	228	5	222	227	176
Falcataria moluccana	Albizia	Molokai	50	2	-	2	20
Ficus religiosa	Bo tree	Molokai	1,361	-	2	2	45
Garcinia xanthochymus	Gourka	Molokai	18	1	4	5	8
Hedychium gardnerianum	Kahili ginger	Molokai	7	-	-	-	2
Merremia tuberosa	Wood rose	Molokai	7	12	81	93	9
Montanoa hibiscifolia	Tree daisy	Molokai	60	1	-	1	29
Pennisetum setaceum	Fountain grass	Molokai	65	-	-	-	6
Pereskia aculeata	Barbados gooseberry	Molokai	48	-	28	28	24
Phormium tenax	New Zealand flax	Molokai	41	-	12	12	19
Prosopis juliflora	Long-thorn kiawe	Molokai	86	5	116	121	98
Pueraria lobata	Kudzu	Molokai	8	30	143	173	33
Rhizophora mangle	Red mangrove	Molokai	28	6	501	507	28
Rosa multiflora	Multifloral rose	Molokai	10	-	1	1	10
Salsola kali	Tumbleweed	Molokai	901	468	1773	2241	121
Senecio madagascariensis	Fireweed	Molokai	746	2545	719	3264	162
Setaria palmifolia	Palm grass	Molokai	3	5	14	19	6
Ulex europaeus	Gorse	Molokai	79	-	-	-	11
VERTEBRATES							
Eleutherodactylus coqui	Coqui frog	Molokai	137	-	-	-	34
Lepus curpaeums	Common rabbit	Molokai	1	-	-	-	2
Pycnonotus cafer	Red-vented bulbul	Molokai	210	-	-	-	30
INVERTEBRATES							
Aceria guerreronis	Coconut and flower mite	Molokai	1	-	-	-	3
Thysanococcus pandani	Hala Scale	Molokai	269	-	-	-	8
Quadrastichus erythrinae	Erythrina gall wasp	Molokai	<1	-	-	-	3
Wasmannia auropunctata	Little fire ant	Molokai	668	-	-	-	105
PLANT DISEASE							
Banana Bunchy Top Virus	BBTV	Molokai	1,449	82	337	419	155
AQUATIC							
Cassiopea andromeda	Upside down jellyfish	Molokai	32	-	-	-	20
	TOTALS		**7,585**	**3,373**	**5,053**	**8,426**	**1,399**

OUTREACH & EDUCATION

Activities under the Outreach and Education portion of this grant are covered in a separate report.

ADDITIONAL INFORMATION

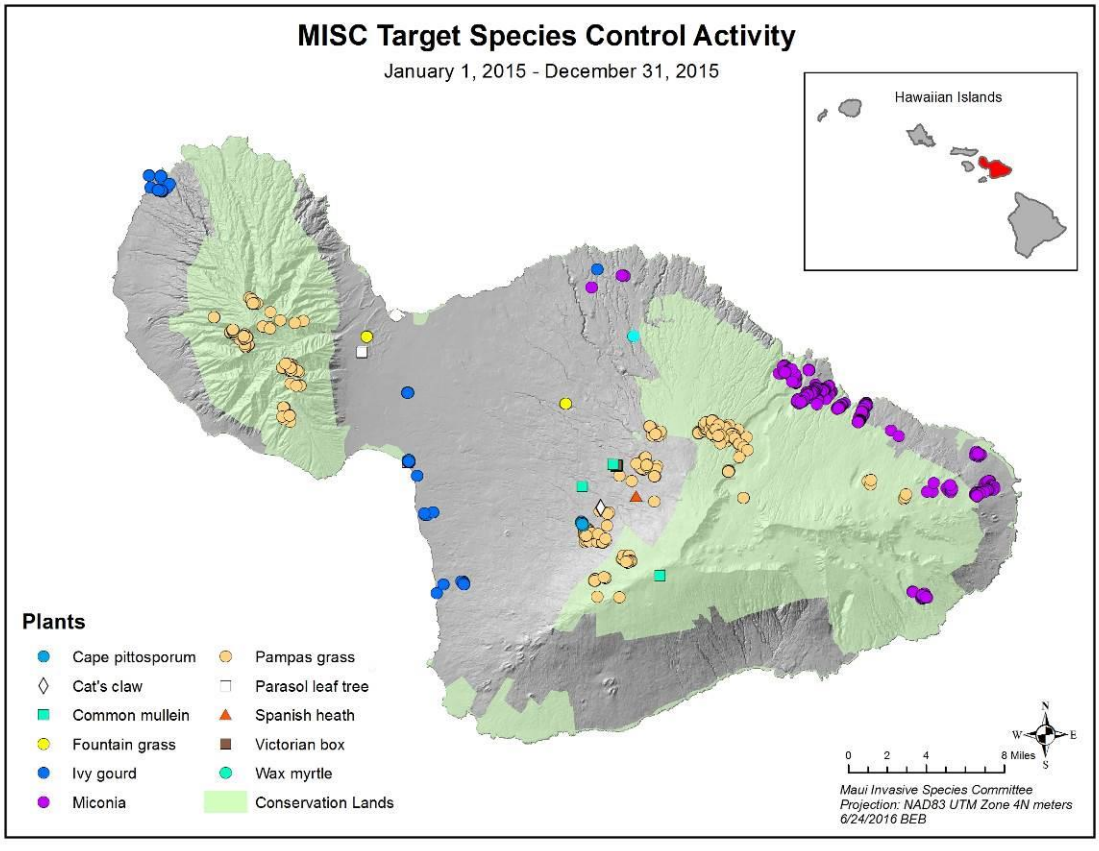
MISC and MoMISC are projects of the University of Hawai'i – Pacific Cooperative Studies Unit. Work conducted by staff from the Maui Invasive Species Committee and Molokai Invasive Species Committee benefited from strong partner support, including: County of Maui, U.S. Forest Service, Hawai'i Departments of Land and Natural Resources, Agriculture and Transportation, Hawai'i Tourism Authority, and others.

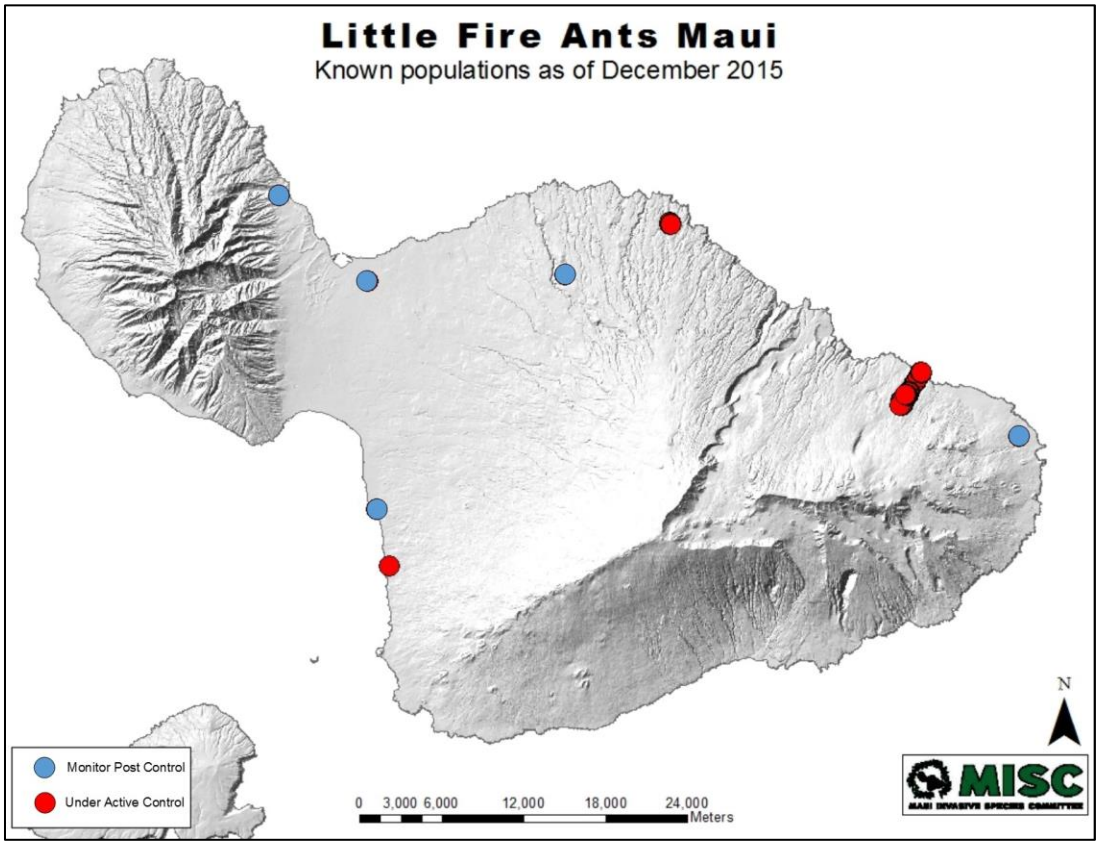
CONTACT INFORMATION

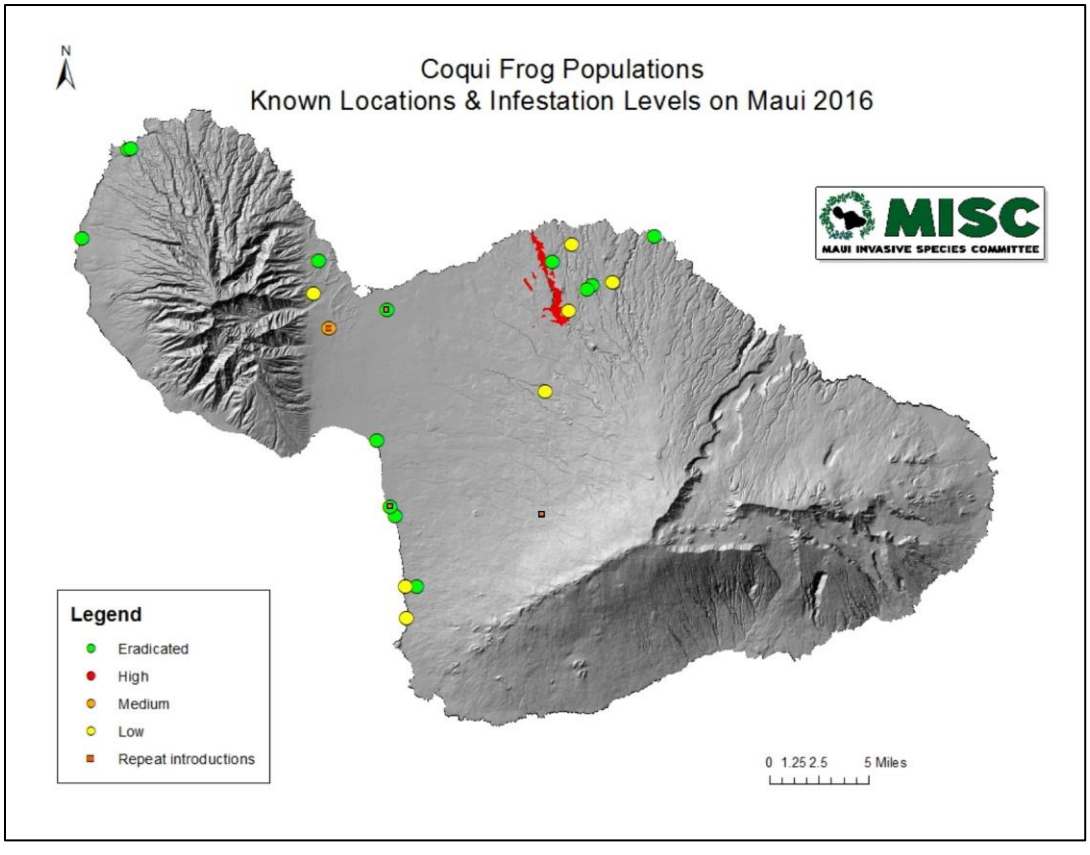
Adam Radford
MISC Manager
P.O. Box 983
Makawao, HI 96768
Ph: 808-573-6472 (MISC)
Email: miscmgr@hawaii.edu

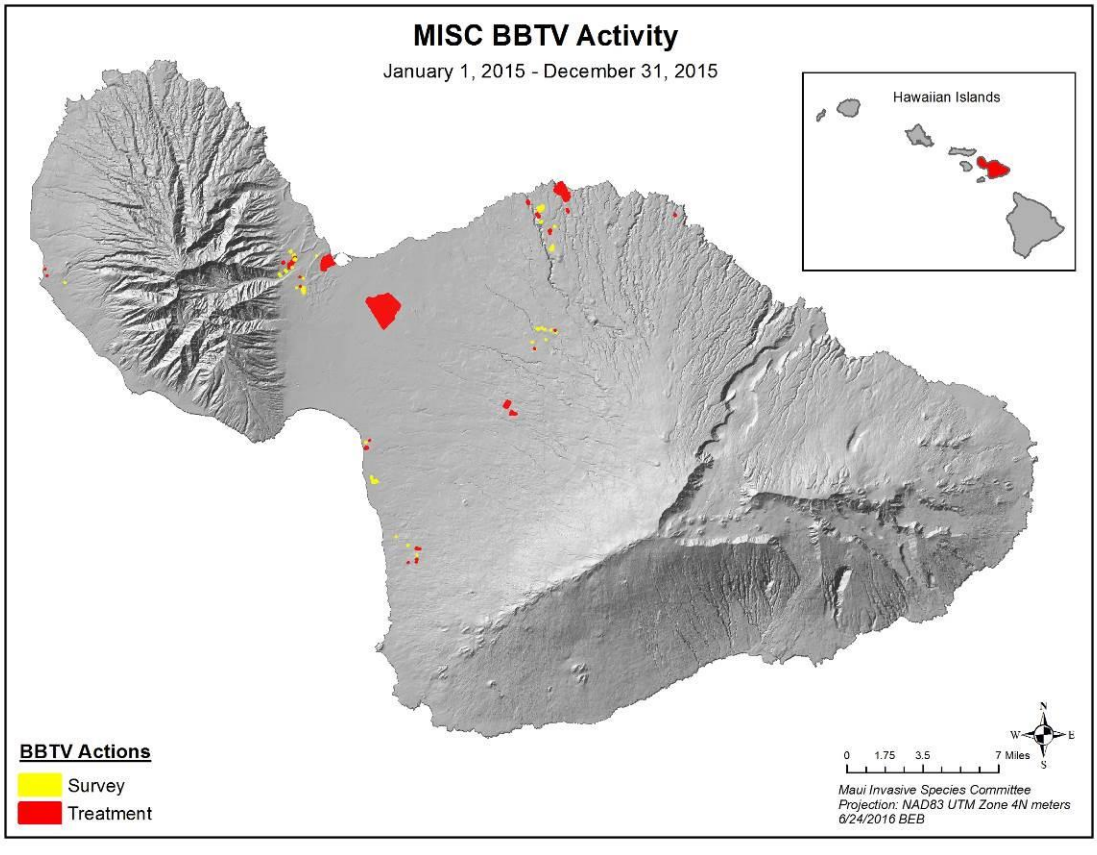
Lori Buchanan
MoMISC Field & Outreach Coordinator
P.O. Box 220
Kualapu'u, HI 96767
Ph: 808-954-6585
Email: lbuchanan@tnc.org

Training Maui's Master Gardeners on BBTV identification


MISC Target Species Control Activity
January 1, 2015 - December 31, 2015
Hawaiian Islands
Plants
Cape pittosporum
Cat's claw
Common mullein
Fountain grass
Ivy gourd
Miconia
Pampas grass
Parasol leaf tree
Spanish heath
Victorian box
Wax myrtle
Conservation Lands
0 2 4 8 Miles
N
W
E
S
Maui Invasive Species Committee
Projection: NAD83 UTM Zone 4N meters
6/24/2016 BEB


Little Fire Ants Maui
Known populations as of December 2015
Monitor Post Control
Under Active Control
0 3,000 6,000 12,000 18,000 24,000
Meters
N
MISC


N
Coqui Frog Populations
Known Locations & Infestation Levels on Maui 2016
MISC
MAUI INVASIVE SPECIES COMMITTEE
Legend
Eradicated
High
Medium
Low
Repeat introductions
0 1.25 2.5 5 Miles


MISC BBTV Activity
January 1, 2015 - December 31, 2015
Hawaiian Islands
BBTV Actions
Survey
Treatment
0 1.75 3.5 7 Miles
N
W
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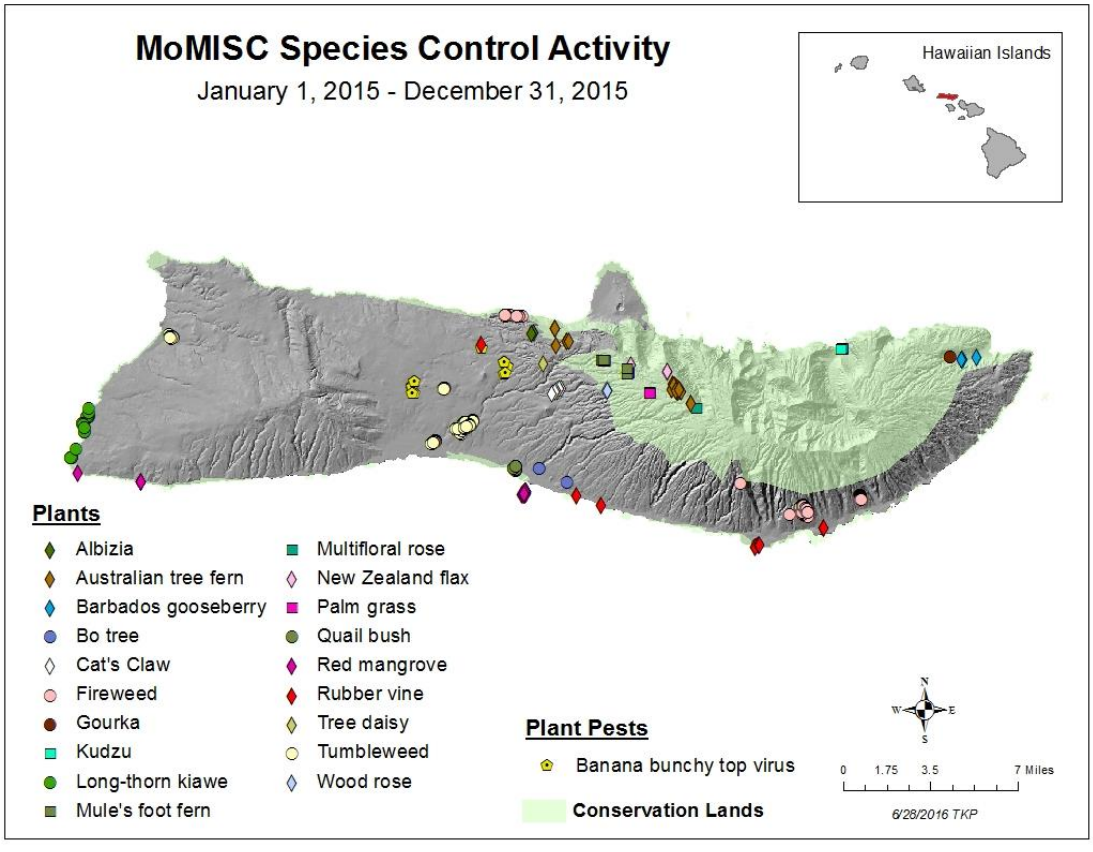
S
Maui Invasive Species Committee
Projection: NAD83 UTM Zone 4N meters
6/24/2016 BEB


MoMISC Species Control Activity
January 1, 2015 - December 31, 2015
Hawaiian Islands
Plants
Albizia
Australian tree fern
Barbados gooseberry
Bo tree
Cat's Claw
Fireweed
Gourka
Kudzu
Long-thorn kiawe
Mule's foot fern
Multifloral rose
New Zealand flax
Palm grass
Quail bush
Red mangrove
Rubber vine
Tree daisy
Tumbleweed
Wood rose
Plant Pests
Banana bunchy top virus
Conservation Lands
N
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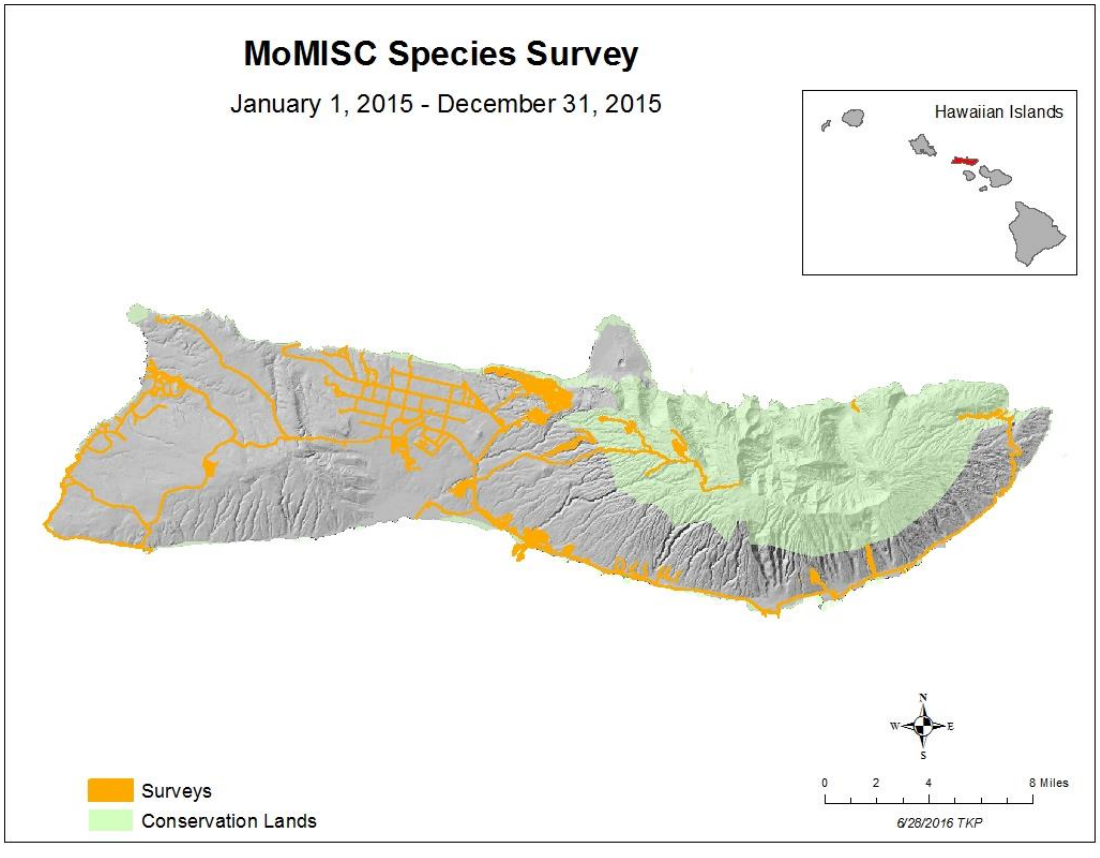
0 1.75 3.5 7 Miles
6/28/2016 TKP


MoMISC Species Survey
January 1, 2015 - December 31, 2015
Hawaiian Islands
Surveys
Conservation Lands
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0 2 4 8 Miles
6/28/2016 TKP