Programmatic Report
April 1, 2003 - September 30, 2003
Maui Invasive Plant Species Control-IV
SUMMARY OF OBJECTIVES & SEMI-ANNUAL PROJECT RESULTS

Funding from the National Fish and Wildlife Foundation (NFWF) Pulling Together Initiative (PTI) allowed the Maui Invasive Species Committee (MISC) to make significant progress surveying, controlling, or eradicating Maui’s most serious plant threats, using the 728 square-mile island of Maui as a Weed Management Area. NFWF support was augmented by funding or in-kind services from Haleakalā National Park, Pacific Islands Exotic Plant Management Team, U.S. Geological Survey – Biological Resources Division, USDA Forest Service, U.S. Fish and Wildlife Service, Hawai‘i Army National Guard, USDA Tri-Isle Resource Conservation and Development Council, Inc., Hawai‘i Department of Land and Natural Resources, Hawai‘i Department of Agriculture, University of Hawai‘i, Hawai‘i State Legislature, Maui County Department of Water Supply, Maui County Office of Economic Development, The Nature Conservancy-Hawai‘i, Hawai‘i Community Foundation, Maui Land & Pineapple Co., and East Maui Watershed Partnership. Cooperation from federal, state, county and private partners was essential to MISC’s continuing work on plant invasions.

MISC’s priority target plant species are miconia (Miconia calvescens), pampas grass (Cortaderia jubata and C. selloana), fountain grass (Pennisetum setaceum), ivy gourd (Coccinia grandis), giant reed (Arundo donax), rubber vine (Cryptostegia grandiflora), Jerusalem thorn (Parkinsonia aculeata), Malabar melastome (Melastoma candidum), downy rose myrtle (Rhodomyrtus tomentosa), yellow Himalayan raspberry (Rubus ellipticus), and ruby salt bush (Enchylaena tomentosa). These invasive plants threaten Maui’s economy, important watersheds, and native ecosystems, which are home to a remarkable diversity of plant and animal life, including 79 federally listed endangered or threatened plant species.

During the period from April – September, 2003, MISC conducted ground and aerial transects to locate and survey target species. Field crew removed or chemically treated target plants on the ground and spot-sprayed herbicide from the air on inaccessible plants. Thorough documentation of all control activities included spatial information, which MISC used to guide day-to-day control work and to prioritize future action.

The Pulling Together Initiative funds helped MISC make significant progress in controlling its priority target species during the first half of this grant period:

- 12,885 miconia plants were controlled, 280 of which were flowering or seeding.
- 873 pampas grass plants were controlled.
- 304 fountain grass plants were controlled. Subsequent surveys of known fountain grass locations indicate that regeneration is diminishing.
- 2,127 ivy gourd plants were controlled.
- 1.5 acres of giant reed were treated.
- 7 rubber vine plants were controlled.
- 6 downy rose myrtle plants were re-treated at previously controlled sites.
Figure 1. Location of Priority Target Plant Species on Maui.

The on-the-ground physical labor of pulling and treating invasive weeds, the aerial surveys of inaccessible areas, the spatial analyses of new and existing data, and the sheer logistics of managing an operation of this magnitude would not have been possible without support from NFWF.

MISC met public awareness objectives during the last six months by presenting information at community events and meetings, lecturing at high school and college classes, and by testifying before the Maui County Council and Hawai‘i State Legislature. Other avenues for disseminating information on invasive species included newspaper articles, periodicals, a children’s book, and local radio and television pieces.

MISC recognizes the need to enhance its own sustainability. During this time period, MISC succeeded in securing funding from Maui County Office of Economic Development and Maui County Department of Water Supply, State of Hawai‘i, and U.S. Fish and Wildlife Service. The National Park Service has significantly expanded financial support for and commitment to work on miconia on Maui. MISC began actively exploring the possibility of forming of a 501(c)(3) non-profit organization to increase funding options.
MISC also recognizes the need to build staff capacity and leverage resources to enhance efficiency. MISC hired a new Manager and expanded expectations for the position regarding fundraising and partner relations. MISC also affirmed its commitment to Maui-based public relations and education by filling the MISC PR position after the incumbent left to take a newly-created statewide PR position.

MISC worked cooperatively with other island-based Invasive Species Committees (ISCs) to share operational knowledge and experience. Each ISC (Big Island (BIISC), Molokai (MoMISC), O‘ahu (OISC) and Kaua‘i (KISC)) is a multi-sector partnership working on the most threatening incipient species on their respective islands and functioning as a rapid response team to control or eradicate priority pests. The ISCs also work together under the Coordinating Group on Alien Pest Species (CGAPS) to improve statewide coordination for controlling existing pests and preventing new pests from entering the state.

Statewide support for invasive species issues is growing. The Hawai‘i Legislature created the Hawai‘i Invasive Species Council, only the fourth such council in the nation. The Council is expected to help marshal resources for and bring an integrated approach to invasive species issues in Hawai‘i.

**PROJECT RESULTS: APRIL 1, 2003 – SEPTEMBER 30, 2003**

1. **MICONIA** (*Miconia calvescens*):

Miconia is a broad leaf tree from Central America that inhabits wet to temperate forests ranging from 1,000–6,000 feet in elevation. Miconia plants can produce fruit by the time they are four to five years old, with each tree generating 10 to 80 million seeds per year. Seeds are spread by fruit-eating birds and other animals and in contaminated soil that adheres to hiking shoes, equipment, and vehicles. Recent evidence shows that seeds are able to remain viable in the soil for at least ten years before germinating. Experience in Tahiti and Hawai‘i has shown that some trees, even fruiting trees, are missed by ground crews and aerial surveys during the first pass, necessitating revisits and complicating control efforts.

The Maui Invasive Species Committee has worked since November of 1999 to survey, map, and control miconia in East Maui over a 10,000-acre area (see Figure 1). The results of these surveys indicate that despite past control efforts, there is more miconia than previously estimated. Survey crews continue to locate plants in unexpected areas, far from known seed banks. Resource managers now recognize miconia as the most serious plant threat to Maui’s native rain forest ecosystems. Due to the explosive reproductive capabilities of this weed, the interagency program to control miconia on Maui must continue to expand and accelerate.

**Objective:** To control miconia on Maui by focusing on the sustained long-term, island-wide goal of “Zero Fruiting Trees.”

**Actions Taken:**
- Mapped, treated, re-surveyed, and re-treated
  
The MISC field crews conducted ground and aerial work over 15,083 acres. All acres were surveyed and mapped. MISC controlled a total of 12,885 miconia plants between April 1,
2003 and September 30, 2003 (5,947 ground effort, 6,938 aerial spray). A total of 280 flowering or fruiting plants were controlled.

- Aerial reconnaissance and spot-spray operations
  During this period, expanded aerial spray operations, supported by funding from the National Park Service, successfully targeted large miconia populations in the East Maui Watershed. MISC continued to explore suspect areas for previously undetected mature trees and to use a combined “Spray/Reconnaissance” method for aerial control in target-rich management zones. The “spray-con” approach enhances efficiency by spraying trees when they are first spotted, rather than surveying and going back later to spray. Aerial spot-spray operations typically last all day and use two helicopters.

- Peripheral and core areas
  Ground and aerial reconnaissance and control efforts occurred in both “peripheral” populations outside the Hana core infestation, and in the Hana-core area. MISC crews concentrated on ground-based control and reconnaissance efforts with particular emphasis on eliminating flowering trees around population perimeters. MISC crew killed all known or discovered miconia, using thin-line basal treatment or hand-pulling, depending on size and weather constraints. Hana-based crews focused primarily in the core area. Aerial activities occurred in both peripheral and core areas during this time period.

- Sub-canopy miconia
  Field crews followed up aerial reconnaissance with ground surveys and control work. Priority emphasis was on areas that might harbor reproducing sub-canopy miconia, particularly in areas around trees spotted by air.

- GPS / GIS tracking and mapping
  MISC used GPS tracking and integrated GIS database-generated maps to guide aerial and ground strategy, survey, and control work.

- Reassessment
  MISC conducted evaluations to ensure that the miconia strategy incorporated all current data and biological information. Evaluations occurred during regular meetings of the Committee and also during a miconia strategy session held in May, 2003.

- Bio-control
  MISC has not been able to resume culturing the fungus Colletotrichum gloeosporioides f. sp. miconiae. MISC is seeking to generate interest in maintaining the fungus at Maui Community College.

- Participation in the interagency “Miconia Incident Command System”
  MISC worked with the National Park Service under the interagency Miconia Incident Command System. The National Park Service provided expanded financial and operational support for miconia control activities and assumed a leadership role in the ICS structure. During this time period, the National Park Service’s Exotic Plant Management Team (EPMT), the existing Hana crew, and the MISC field crew worked cooperatively together under the Incident Command System. MISC continued to provide operational planning, aerial and ground support, crew training, data management, and logistical and administrative support for the combined operation.

- Continued public information and surveillance for new locations
  MISC continued public outreach and education activities to solicit information about new miconia locations from pig hunters, hikers, water supply ditch and electric line workers, road
workers, and residents.

- **Measures to prevent seed dispersal by miconia workers**
  The MISC crew continued to follow strict miconia decontamination procedures. Crew footwear and other gear are "dedicated," i.e. used only for work involving miconia and are clearly marked for miconia use. Vehicles are washed after each trip and gear is cleaned regularly. With the increase in miconia operations that began in January 2003, a part-time worker was hired to focus exclusively on gear decontamination. All miconia crews adhere to a single standardized decontamination protocol.

Figure 2. Miconia tree in East Maui.

Figure 3. Miconia leaves.
2. **PAMPAS GRASS (Cortaderia jubata and C. selloana):**

Pampas grass is a large, tussock-forming grass native to South America. Each plant can produce thousands of wind-dispersed seeds that can remain viable in the soil for at least six years before germinating. Both species have proved to be aggressive invaders in natural areas of California, New Zealand, and South Africa. *C. jubata* is listed on the Hawai‘i Noxious Weed List; however, *C. selloana* is not. Until recently *C. selloana* was thought to be non-invasive. New evidence suggests *C. selloana* is also extremely invasive and Noxious Weed status is being sought for this species as well. Distribution data shows that pampas grass has invaded numerous rain forest and bog areas on East and West Maui. It has been detected and controlled in Haleakalā National Park, preventing invasion of Haleakalā Crater and the surrounding shrublands.

**Objective:** Treat all known populations and survey potential habitat. All populations in the wild will be re-visited and re-treated as necessary. Treat all known populations on private property. Aerial reconnaissance will be continued over inaccessible watershed areas.

**Actions Taken:**

- Aerial search missions discovered 159 plants. Pampas grass searches occur between September and January when the seed plumes are easy to see during aerial surveys.
- Ground missions in natural and residential areas controlled 873 pampas grass plants. Follow-up surveys have found juveniles at most sites and control is on going.
- MISC surveyed 1,535 acres for pampas grass (1,320 acres by air, 215 by ground).
- Education and outreach continued to focus on the risks associated with *C. jubata* as well as *C. selloana*.

![Figure 4. Pampas grass upcountry.](image)

![Figure 5. MISC field crew controlling pampas grass.](image)
3. **Fountain Grass (Pennisetum setaceum)**:

Highly flammable fountain grass (on the Hawai‘i Noxious Weed List) has been recognized since the 1960s as a threat to agriculture and natural areas of Maui. A native of Africa, fountain grass directly threatens dry forest species because it out-competes native species for resources, changes the soil chemistry, and is adapted to a fire regime, unlike native species.

Fountain grass is readily dispersed by vehicles, humans, wind, and water and can become established at elevations ranging from sea level to over 8,000 feet. Fountain grass is widespread on the Big Island of Hawai‘i and could easily be transported to Maui’s military training grounds. Seeds are known to remain viable in the soil for at least four years.

**Objectives**: Treat all known populations and survey potential habitat. Thoroughly search a one-mile radius around known populations. Conduct follow-up surveys biannually in all areas known to have had fountain grass in the past.

**Actions Taken**:
- MISC crews surveyed 12 acres and controlled 304 fountain grass plants in areas known to have had fountain grass. Surveys up to a half-mile around known plants were completed and will continue until the seed banks have been exhausted.

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**Figure 6.** Partnering with The Nature Conservancy – TNC staff rappels to inaccessible site for fountain grass control.

**Figure 7.** Fountain grass.
4. **Ivy Gourd** (*Coccinia grandis*):

This species (on the Hawai‘i Noxious Weed List) exploded in the 1980s on O‘ahu and in the Kona area of the Big Island, creating huge problems for agriculture and lowland conservation sites. It was first found on Maui in 1992 and is considered eradicable because of its dioecious condition (both male & female plants are generally necessary for pollination and seed set). Once seeds are set the seed bank persists for at least 3-4 years. Seeds are primarily bird-dispersed.

**Objective:** Treat all individuals of known populations and conduct comprehensive surveys of areas near known infestations. Revisit all sites of control.

**Actions Taken:**
- A total of 2,127 plants were controlled during this time period. All controlled sites were revisited one to three months after treatment to address recruitment from established seed banks. In several instances, a section of root from a previously treated plant was able to re-sprout. Revisits and surveys continue.
- Earlier visits to bio-control release sites initiated by Hawai‘i Department of Agriculture indicated the need for mechanical and chemical control, which MISC performed during this period. MISC is achieving good control results on existing infestations, but continues to find new sites.
- MISC plans to work with golf course managers and crews at a West Maui resort to prevent continued spread of ivy gourd by maintenance crews.

![Figure 8. Ivy gourd fruit and leaves.](image-url)
5. **Giant Reed (Arundo donax):**

Giant reed is a large, cane-like grass native to India that can grow to over 20 feet in height and form monotypic stands that out-compete other plants. It is a major weed in the southern United States where it crowds out native plants and clogs rivers and flood control drainages. Reproduction is primarily vegetative, through stem and root fragments. MISC work concentrated on the Waikupu area of Central Maui and expanded into the upcountry area of Kula.

**Objective:** Continue to control giant reed in persistent wild populations and work to secure landowner permission to remove this plant from ornamental situations. Surveillance for new location records will be continued.

**Actions Taken:**
- MISC treated approximately 1.5 acres of giant reed during the past six months.
- Infested sites needed and received continued re-treatment. Refinements to MISC’s techniques are proving effective. MISC plans to conduct trials with different herbicides to enhance treatment efficacy.

![Figure 9. Giant reed infestation.](image)
6. **RUBBER VINE** (*Cryptostegia grandiflora*):

Rubber vine is a woody, climbing vine native to Madagascar. It is one of the 20 worst weeds of Northern Australia. Rubber vine can grow in a variety of conditions, forming dense shrubs in open areas, or growing over trees up to 15 meters in height. Rubber vine is a milkweed relative and is extremely toxic to livestock and humans that consume or come in contact with it. Seeds are wind and water borne and seed longevity is unknown at this time.

**Objective:** MISC will control all known populations of rubber vine.

**Actions Taken:**
- MISC controlled 6 plants, all in residential or business areas. Most known locations are in landscape settings and consequently no wide-scale, systematic surveys for rubber vine have been conducted around controlled plants. Monitoring of sites has occurred to ensure treatment efficacy.

![Rubber Vine Leaves and Flower](image)

**Figure 10.** Rubber vine leaves and flower.
7. **Other Invasive Plants:**

Five species were added to MISC's list of priority targets in September 2001 after extensive survey and evaluation: Jerusalem thorn (*Parkinsonia aculeata*), Malabar melastome (*Melastoma candidum*), downy rose myrtle (*Rhodomyrtus tomentosa*), yellow Himalayan raspberry (*Rubus ellipticus*), and a chenopodium (*Enchytraea tomentosa*).

**Objective:** Species added to the MISC priority control list will be controlled or eradicated.

**Actions Taken:**
- Five downy rose myrtle (*Rhodomyrtus tomentosa*) plants were found and treated. MISC staff continues to monitor and control any new individuals.
- Monitoring of previous control sites for other species continued.

8. **Assessment of Additional Targets:**

**Objective:** Mapping and assessment of additional plant species for inclusion in the MISC priority control list will continue on an ongoing basis with new species added based on the recommendation of subject matter experts and the inter-agency MISC Committee.

**Actions Taken:**
The MISC Committee reviewed a list of potential target species for inclusion in a grant proposal to the U.S. Fish and Wildlife Service for work on potentially eradicable incipient species. In drafting the proposal, the Committee considered a species' threat to Maui's ecosystems, cost to control, and feasibility of control. The Committee decided to address fourteen potentially eradicable species as part of the funding proposal. The project will last for one year at which time MISC will evaluate whether any of those species should be added to the priority control list.

9. **Nursery Surveys and Education:**

**Objective:** Educate nursery personnel, landscapers and landscape architects about invasive species in an effort to prevent the sale and distribution of known invaders.

**Actions Taken:**
- MISC created and implemented its first annual award program, "Malama i ka 'Āina," to encourage landscape professionals, hotels, and nurseries to become informed about invasive plants and to take proactive steps to prevent the spread of invasive species. Co-sponsored by the Maui Association of Landscape Professionals and endorsed by Maui County, the award will be presented in the fall.
- MISC conducted slide presentations for the Maui Association of Landscape Professionals urging the practice of researching weedy tendencies in plants before buying or planting, and introducing the Australian Weed Risk Assessment System as a model for screening imports.
- MISC conducted inspections of cooperating nurseries to look for known invasive plants that are not yet naturalized and worked with botanical gardens to remove known invasives.
10. PUBLIC RELATIONS AND EDUCATION:

Objective: To make MISC’s actions visible and to cultivate a positive organizational image by using all forms of media to reach a broad audience.

Actions Taken:

- MISC staff manned educational display booths and answered questions at several public events:
  - Maui Community College Agriculture & Natural Resources Awareness Day, April 10.
  - The Ulupalakua Thing: Maui Agricultural Products Fair, April 26.
  - Hawai‘i Conservation Conference, Honolulu, July 10-11.
  - Watershed Awareness Involvement Forum, September 5.
  - Zoo Maui Special Event, September 13.
- MISC staff prepared or contributed to a number of press releases and articles on invasive species:
  - “Tiny frogs create a huge nuisance,” in the Baltimore Sun, April 17.
- MISC presented lectures on invasive species to groups including:
  - Two high school classes attending Maui Community College Agriculture & Natural Resources Awareness Day, April 10.
  - Trinity Western University, May 22.
  - Kiwanis Club of Maui, June 12.
  - Maui Hotel Association, July 22.
  - Maui Nui Botanical Garden’s Weed and Pot Club, July 30.
- MISC hosted a Brazilian Visitor Forum on June 3.
- MISC contributed text and photos to “Invaders,” a Ranger Rick publication.
- MISC’s PR Specialist has developed good contacts with local radio programmers and hosts, resulting in five guest appearances during this time period on two different shows. Radio program content focused on Earth Day, coqui frogs and MISC’s landscaper award. MISC also produced a 60-second radio spot, which aired from May 19 to June 1. Alexander & Baldwin awarded MISC production and radio air costs.
- MISC participated on an interagency steering committee formed to provide relevant environmental education materials (including invasive species) to Maui County High Schools.
- MISC’s PR Specialist appeared on a TV-PSA announcing the Landscaper’s Award, which aired on August 12, 16, 19, and 23.
- MISC staff participated in meetings with the Coordinating Group on Alien Pest Species, Maui County Council members, Maui County Mayor Arakawa and his staff, and functioned as a point of contact between MISC and other organizations.
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