Title: Detection and Control of Invasive Species in Hawai'i County
Organization: Big Island Invasive Species Committee
Award: $ 340,280
Working Group: Establishes Pests

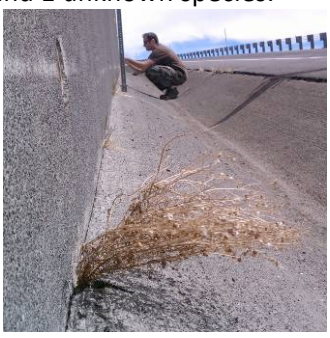
Over the past year, BIISC has focused on three adaptive management priorities; 1) early detection of new nonnative species, 2) rapid response to incipient species and new locations of existing invasive species, and 3) education and outreach. BIISC also remains "on call" for crisis management as new priorities emerge – in 2011 we were able to rapidly and efficiently refocus operations to prioritize axis deer as an emergent target.

BIISC's work has been strongly focused on achieving the Established Pests goals and objectives of the Hawai'i Invasive Species Council's Strategic Plan. The committee, which oversees BIISC priority setting, met two times during this reporting period, less than normal as energies were focused on management of the newly formed ad hoc Big Island Axis Deer working group – which met four times. In response to axis deer becoming the priority species, BIISC was able to transition its coqui control team to a vertebrate early detection and survey team. Following extensive training and capacity building BIISC is now the primary responder for deer and numerous other vertebrate species. In keeping with BIISC's mission we have also been working on control of several priority established plant populations, including 1) Miconia (*Miconia calvescens*), and 2) Poison Devil's Pepper (*Rauvolfia vomitoria*). * Appendix 1 outlines BIISC performance on 2011 established control targets.

BIISC Established Pests: Measures of Effectiveness

Number of species detected and evaluated for feasibility of eradication:
After nearly 4 years of roadside surveys, nearly the entire island has been covered by BIISC Early Detection team. The addition of a staff botanist has been a boost for identification of new plants.

- The Big Island Invasive Species Committee's Early Detection Team is close to completing the first-ever island-wide survey of major, secondary, and residential roads for new incipient naturalized plant species. During the funding year, 1,200 miles of roadside botanical surveys were conducted in the districts of Hāmākua, North Hilo, South Hilo, and Lower Puna. Specimens from 34 species were collected, including 1 new state record, 4 new records of naturalization, 11 new island records, 8 pending determinations from BISH, and 1 unknown species.
- A total of 7 species, thus far, have been identified as targets for eradication. Further priority assessments will be conducted this year on all new species found during the surveys. The species will be ranked according to weediness score, abundance and distribution, and feasibility of control. The BIISC field crew has controlled all *Buddleja madagascariensis*(Smokebush) populations in the Waimea region, and is currently working on eradicating *Pereskia aculeata*(Barbados gooseberry), while continuing to control local populations of priority species and mapping distributions.


BIISC Botanist surveying Mauna Kea summit, dead fireweed in foreground

- Site surveys are botanical surveys of discrete targeted locations and were conducted at the following sites: Kohala Ranch Private Subdivision (naturalized *Erythrina crista-galli* collected), Floribunda Palms Nursery, Mauna Kea Summit (fireweed, *Senecio madagascariensis* at 13,000 feet), Kapapala Ranch, Hawaii Tropical Botanical Garden (over 2,000 species cultivated).

Number and area of priority invasive species eradicated and/or controlled:
Control and eradication efforts on priority plants centered on Miconia, Poison Devils Pepper, Plume Poppy (*Bocconia frustescens*) and Rubber Vine (*Cryptostegia madagascariensis)*, while priority vertebrate control efforts have focused on coqui (*Eleutherodactylus coqui*) and axis deer (Axis axis). Ongoing surveys continue to uncover new established pests, however additional control targets means the need to source additional resources.

- Two populations of Miconia have been targeted for control on the Big Island. Leeward populations south of Kona are targeted for local eradication while Hāmākua populations are being controlled to prevent spread to the Kohala Mountain area.
- Containment of Poison Devil's Pepper along southern (high elevation) and western (natural area) population limits, and surveys of numerous gulches along eastern limit (controlling over 10,000 plants). An aerial survey of *Rauvolfia vomitoria* was performed to determine extent of range. Extensive herbicide trials (together with CTAHR) to determine the most effective and lowest dose of herbicide necessary to contain Rauvolfia vomitoria.
- Plume Poppy was been identified in Manukā State Park as well as surrounding public and private properties. BIISC surveyed over 500 acres and treated approximately 250 plants to locally eradicate the population.
- Rubber vine has been named "Australia's worst weed" and was identified as being in the Kaʻu, North Kona, South Kohala and North Kohala district of Hawaiʻi Island through the efforts of the BIISC Early Detection team. During this reporting period control efforts have covered 2.6 acres and encompassed 146 person hours. A total of 18 *Cryptostegia* have been treated.
- BIISC was invited by the Piʻihonua community to lead a campaign and investigation on the impacts of Albizia in rural neighborhoods – resulting in a new mapping technique and increased awareness of the threats caused to human safety and infrastructure. Results indicate imminent threats to Hilo Medical Center, evacuation routes and to people and property living near these looming giants who are already over 100 feet tall in places.

Albizia trees loom over much of Hilo now and are a daunting threat to people and infrastructure.

- Responded to reports of feral European rabbits (*Oryctolagus cuniculus*) in Pahala and Naʻalehu ranches. Seven rabbits were recovered by the ranchers, while one or more remain at large. Efforts continue to capture any remaining rabbits.

Prioritization processes identified and in place:
Every year BIISC reviews its priority species list together with committee members and local experts. In 2011 BIISC hired a botanist, and completed a comprehensive island wide roadside survey. Thus we look forward to moving from an ad hoc to a systematic prioritization process for both plants and animals.

Implementation of the priority response and control actions of plans for the coqui frog, West Nile Virus, and Avian Influenza:

- BIISC has treated a total of 37 acres of high-value natural areas on government (State, County, Federal) and Private (Kamehameha Schools) land with citric acid chemical. Twenty six acres of which were in Puʻu Makaʻala NAR and Olaʻa Forest Reserve which contain critical habitat for *Drosophila mulli*.
- Worked with researcher from the UH Hilo, Utah State University, USDA Forest Service and USDA APHIS, supplying them with information, area infestation maps, and field help when requested.
- Helped train residents in Kaʻu and Waimea to detect, hand capture and treat coqui frogs as well as steps necessary to prevent reinfestation. BIISC continues to play a role in the organization

and management for the successful elimination of coqui in neighborhoods that have active community groups.

- Developed and published a brochure targeted for residents of Hawaii Island with information that includes appropriate chemicals to use, how to find and catch coqui by hand, and steps to take to prevent infestation or reinfestation of frogs.

Number and names of species, habitats, ecosystems, agricultural, and managed areas protected because of control efforts:

- Target species are chosen for the threat that they pose to Hawai'i County's high conservation value natural areas or to agricultural production.
- Plume Poppy was removed from Manukā State Park.
- BIISC surveys along transportation corridors leading into Hawai'i Volcanoes National Park ensures that no new target weeds infest the park.
- Population surveys of the Hawaiian Coot (*Fulica alai*) and the formation of the Lokowaka Community partnership help ensure a future for this endangered species. The Lokowaka coot population is experiencing reproductive failure due to a suite of invasive carnivores, and further actions are needed to prevent its extirpation.
- Our "line in the sand" strategy for Miconia along the Hāmākua Coast has kept this weed out of the Kohala Mountain ecosystem.
- Surveys of axis deer have determined the extent of the population and the threat this species poses to local ranching and agricultural livelihoods island-wide. Over 666 man hours were spent along roads, trails and high-vantage points that covered a survey area of over 7,970 acres in search of axis deer (*Axis axis*). Axis deer have been reported in most districts of Hawai'i Island, including Puna, Ka'ū, South Kona, South Kohala, and North Kohala. Only one district has a confirmed sighting (Ka'ū), however signs of scat, rubbings and tracks may have been found in North Kohala.

Other activities:

Additional activities also helped achieve HISC objectives.

Capacity development: The formation of a BIISC vertebrate team has resulted in extensive capacity building of staff and partners. BIISC staff have received training in the following areas: ATV/UTV, hunter safety education, forward looking infrared (FLIR), night vision, and use of live-animal traps. In addition, plant staff have received certification in safe application of controlled herbicides in 1) agriculture, 2) forestry and 3) aquatic environments.

Axis Deer Control Strategy: Following reports of axis deer being illegally smuggled to the island BIISC formed an axis deer working group, developed a control strategy and eradication budget and received funds to initiate surveys and local control efforts. Four working group meetings have been held, and support from partners ensured that BIISC crew had the best available tools and technology to conduct an initial assessment of the situation. BIISC also hosted two axis deer training workshops to educate partners and colleagues to successfully identify deer signs and address problem animals. Deer training focused on detection but also on techniques to sample for infectious disease.

BIISC training partners to take blood samples from deer to detect bovine tuberculosis.

Snake Response: Two BIISC personnel spent three weeks in Guam to train on the searching, trapping and handling of brown treesnakes (*Boiga irregularis*). Trainee's received an estimated 120 hours of training and may be part of any rapid response to brown treesnakes in Hawai'i.

APPENDIX 1: BIISC deliverables are invasive species prevention and control, in this case 1) eradication, 2) containment and/or 3) exclusion of areas for a suite of target species. Summary of deliverables and goals for 2010, many of which will be continued in 2012:

BIISC target species	Goal	Current Status	2010 Strategy
1. Poison Devils Pepper (*Rauvolfia vomitoria*)	Containment in Kohala, Hawai'i Island.	BIISC is working closely with Kohala Watershed Partnership to contain the infestation from 10,000 acres to a core area of 1,000 acres over the next two years.	Complete map of area of occupancy, form working group, build partnership and target peripheral populations along the perimeter to begin containment process.
2. *Miconia calvescens*	Exclusion from Kohala and high elevations, eradication fro leeward side.	BIISC is working closely with Kamehameha Schools to acquire permissions to access lease lots in South Kona – and with Forest Solutions to coordinate control efforts. BIISC aims to eradicate the leeward population over the next 5 years.	Survey and remove all plants from gulches along Hāmākua Coast from Laupāhoehoe to Honokaa. Ensure the plant does not cross Waipi'o Valley to Kohala Mt. ecosystems.
3. *Bocconia frutescens*	Containment in Kau District. Evaluate as possible eradication target.	All known populations from Manukā have been controlled.	Remove all populations from Manukā and Honomalino areas.
4. *Cryptostegia grandiflora*	Containment to Kau	BIISC has completed a regional survey and is currently working to control all known populations, focusing on control efforts in and around high value conservation landscapes.	Focus removal from Hawai'i State Parks
5. *Buddleia davidii*	Containment to Waimea/Kohala area	BIISC has completed a regional survey and is currently working to control known populations, focusing on control efforts in and around high value conservation landscapes.	Together with partners focus on removal of known populations and increase survey work.
6. *Rhizophora mangle*	Eradication	The permitting process has been influenced by a lawsuit and while this is being sorted BIISC has conducted an island wide survey of mangrove populations. When permits can be obtained control can continue.	Conduct environmental assessment; then manual control of population in Alula Bay.
7. *Eleutherodactylus coqui*	Exclusion	BIISC coqui team has been reformed to take a more comprehensive approach to incipient animal control. Coqui work is not focused on high conservation value forest areas.	Contain the spread of *Eleutherodactylus coqui* in areas of critical habitat for ESA listed species and where it threatens high conservation value forest (together with DOFAW).
8. Invertebrates	Detection and eradication or containment	BIISC is working with HDOA on little fire ant outreach and makes itself available in case of any major outbreaks. BIISC is working with coffee growers in Ka'ū to contain and eradicate Coffee Berry Borer.	Work with Hawai'i Department of Agriculture to identify established invertebrate pests that BIISC can help to control (Little Fire Ant, Naio Thrips, etc.)