

**Title: Detection and Control of Invasive Species  
on the Island of Hawaii, and the Stakeholder-led control of  
invasive albizia on Hawai'i Island: A Demonstration Project**

**Organization:** Big Island Invasive Species Committee

**Award(s):** \$309,000 and \$35,000



**Introduction:** The Big Island Invasive Species Committee works to prevent, detect, and control the highest risk invasive species threats to the Big Island environment, economy, and way of life. Our motto, *Hoala i ka Maka*, translates to “Healing the land, Awakening the people.” BIISC works island-wide to educate and empower Big Island communities to take direct action in their neighborhoods, and advocate for proactive statewide management of invasive species. In all that we do, our guiding principle is service to the land and the people of Hawaii. The Hawaii Invasive Species Council provides consistent and much needed support, ensuring that the highly trained, experienced professionals working at BIISC may continue on our mission.

BIISC thanks the Hawaii Invasive Species Council for funding 45% of our core operating budget this year.

Four primary project areas were funded by the two grants:

1) Expansion of early detection surveys from roadsides to nurseries; 2) Developing a professional public relations approach to community engagement; 3) Continued work on eradication target species, prioritized based on risk level and feasibility of control; 4) A demonstration project exploring cost effective, long-term management of albizia. Project funding supported the majority of costs for a growing crew, including a new field operations supervisor, two additional field staff, two AmeriCorps interns, student workers, and a graduate fellow in remote sensing, and provided the necessary material support for these positions to ensure the success of the project.



*A 2013 stakeholder meeting on albizia as a public safety hazard led to a HISC-funded demonstration project. HELCO, DOFAW, BIISC, USFS, Hawaii County, and the Black Sands Community Association participated.*

A 57% increase (\$140,000) in HISC funds compared to last year was leveraged to produce a 367% increase in field effort, tripling the road and field survey acreage and more than doubling the number of plants controlled. These efficiencies were achieved by an incredibly hard-working crew and new highly skilled staff in key positions, who focused on productivity, intern recruitment, and external funding. BIISC measures progress toward eradication by indexing the average change in phase of management. All locations move from Phase 1, Initial Suppression, Phase 2 Survey and Control; Phase 3, Monitor regenerations; and Phase 4; Long term monitoring). For a plant location to move from Phase 1 to Phase 2, for example, the known core population must be suppressed, and the entire planned survey area completed, and every mature plant treated within one reproductive cycle. During the grant period, six target species started at Phase 1, and three of these were moved at least one whole phase forward, and two of these species are down to single-digit populations, in Phase 3. These include Rubbervine (Phase 2, ), Pampas Grass (Phase 3, down to two parcels) and Pereskia (Phase 3, down to 1 parcel).

**Project 1: Early Detection. Expansion of early detection surveys from roadsides to nurseries:**

Early detection and rapid response is the most cost-effective approach to dealing with invasive species. If plants are detected early, fewer resources are required for their control and eradication.

The Big Island is the center of the state's nursery industry and therefore at high risk for receiving and redistributing pest species. The early detection team began island-wide nursery surveys, held workshops to train and recruit volunteers, promoted the program through community events, and facilitated the endorsement of the Hawaii Island Landscaper's Association for the Plant Pono program.

Objectives (Nursery Surveys):

- Slow the intentional introduction of unscreened, potentially invasive plants by the horticultural trade
- Increase early detection capacity by building a volunteer network
- Improve relationships with partners through shared work
- Provide a proof of concept for the Plant Pono endorsement program

Two formal volunteer workshops were held for 31 UH-CTAHR Master Gardeners, with help from Chuck Chimera from the Hawaii Weed Risk Assessment and Amanda Skelton from Plant Pono. The certified Master Gardeners and trainees learned to identify target species and use the HWRA weed risk assessment tool. All were excited to team up with BIISC on this pilot program. Surveys began on December 4<sup>th</sup>, 2013 and the two members of the BIISC ED team were usually accompanied by two Master Gardener volunteers. Overall response was very encouraging and most of the nurseries understood the issues of invasive species and their roles as being potential vectors—or preventers--of their spread.

The December, 2013 discovery of Little Fire Ants on Oahu and Maui, and a proposed island-wide quarantine in the legislature bolstered the project profile and brought the issue of invasive species to the forefront for all the nursery owners. The Hawaii Island Landscapers Association (HILA) gave their seal of approval to the Plant Pono Endorsement program, signaling expectations for members. A primary objective of this pilot project is to build capacity by training the Master Gardeners to detect the plants on the list. The ED staff was accompanied by 17 volunteers during the reporting period. Some of the notable findings are as follows:

- Japanese blood grass (*Imperata cylindrica*) for sale in a Kailua-Kona nursery
- Three species of *Medinilla* for sale in a Kailua-Kona nursery
- Australian Tree Fern (ATF) for sale in 3 nurseries
- Little Fire Ants found in a Waimea nursery, previously not detected by the owner, or known from that region
- The adjoining DOFAW Waimea Tree Nursery was surveyed and found LFA-free, preventative management was begun.

As of the end of the year, 24 nurseries were visited, 17 agreed to be surveyed, 9 signed on to the program, and 5 met all requirements and are ready to be endorsed. 2015 signs and logo packages are being prepared for distribution to the endorsed nurseries.

Early Detection Deliverables and Measures of Success:

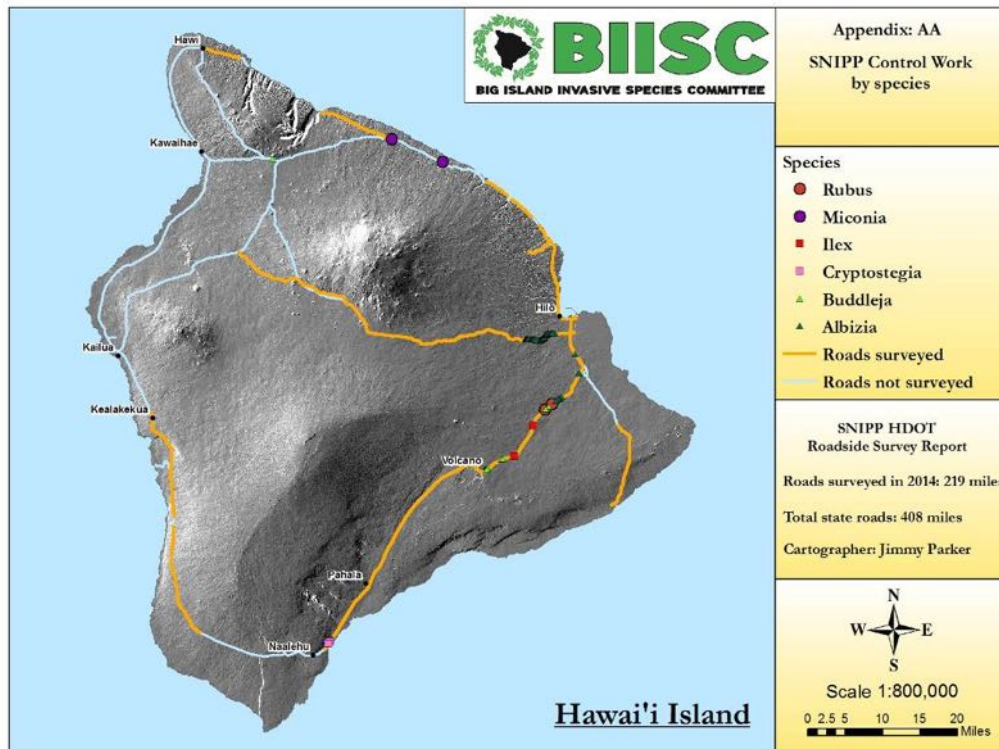
- **Deliverable 1: Semi-annual USFS reports** detailing success of the program, including rates of volunteer participation, nurseries surveyed, nurseries joining the Plant Pono endorsement program, new records from hot spot surveys, and species/acres/mileage surveyed and controlled. Attached. Numbers may vary slightly due to offset reporting periods.
- **Deliverable 2: 200 miles of hotspot surveys**
  - Over 600 miles (300% of goal) of roads were surveyed, including hot-spots in commercial Eucalyptus Forest, and stretches of road with high-risk sites and previous findings of interest.
  - *Cinnamomum burmanii* (Cinnamon), *Ilex cassine* (Dahoon holly), *Rubus sieboldii* (Moluccan raspberry) designated as naturalizing, potential targets. *Ilex* and *Rubus* adopted as target species, herbicide trials completed..
- **Deliverable 3: 25 nurseries surveyed**
  - 24 nurseries (96% of goal) were visited, 17 (68% of goal) agreed to be surveyed.
- **Deliverable 4: 20 trained volunteers** assisting with at least one survey each
  - 31 Master Gardeners attended training (150% of goal)
  - Average of 2 volunteers per survey, >80% of surveys included volunteers
- **Deliverable 5: Publicity, recruitment and assistance for the Plant Pono Endorsement Program** (Rate of enrollment, feedback to program)
  - Rate of enrollment low in part due to lengthy negotiations among ISC partners about the endorsement guidelines, now worked out.
  - Addition of a full time outreach specialist in 2015 will improve promotion of the program. Signs, stickers, and logo packages have been ordered.
  - Feedback has been positive, nursery owners and consumers are excited about the program.
- **Deliverable 6: Target species control; at least 200 acres surveyed, 2000 plants controlled,** rate of progress measured as proportion of planned survey area completed, proportion of locations moved to a new phase of control (e.g. initial control to monitoring, phase 1 to phase 2)
  - During roadside surveys the visible acreage varies widely, typically between 10-100 feet (up to 30 m). This translates to between 1500 and 15,000 acres surveyed.
  - Of the two new target species added as a result of this year's surveys, more than 13,000 individuals have been treated (See Table 1 for detail).
  - Two of six eradication target species were moved from Phase 2 (Control) to Phase 3 (Monitor), while another was moved from Phase 1 (Initial Suppression) to Phase 2 (Control) (100% of locations of each species). All other species remain in Phase 1. BIISC will have capacity in 2015 to cover the entire survey area of six species frequently enough to move toward eradication.
- **Other accomplishments:**
  - The ED Team hired a graduate fellow in remote sensing, and has been developing protocols for surveys by remote-controlled UAV. This work defined parameters to build a HISC-funded professional, and remotely programmable UAV in cooperation with the UH Hilo SDAV lab in 2015.

**Project 2: Development of a professional communications strategy:** Recognizing the higher stakes and need for a new approach, BIISC planned a complete overhaul of our communications strategy. BIISC achieved many of its communications objectives for 2014, and laid the foundation for a very strong communications work in 2015. Every staff member at BIISC now actively engages in community outreach as a core responsibility, BIISC has connected with individual neighborhoods, landowners, partners, and political leaders in meaningful and positive ways, and new hands-on outreach programs have been successfully piloted. The value of a skilled communications director cannot be overstated, and BIISC was very pleased to welcome Franny Kinslow Brewer to the team just *after* end of this grant.

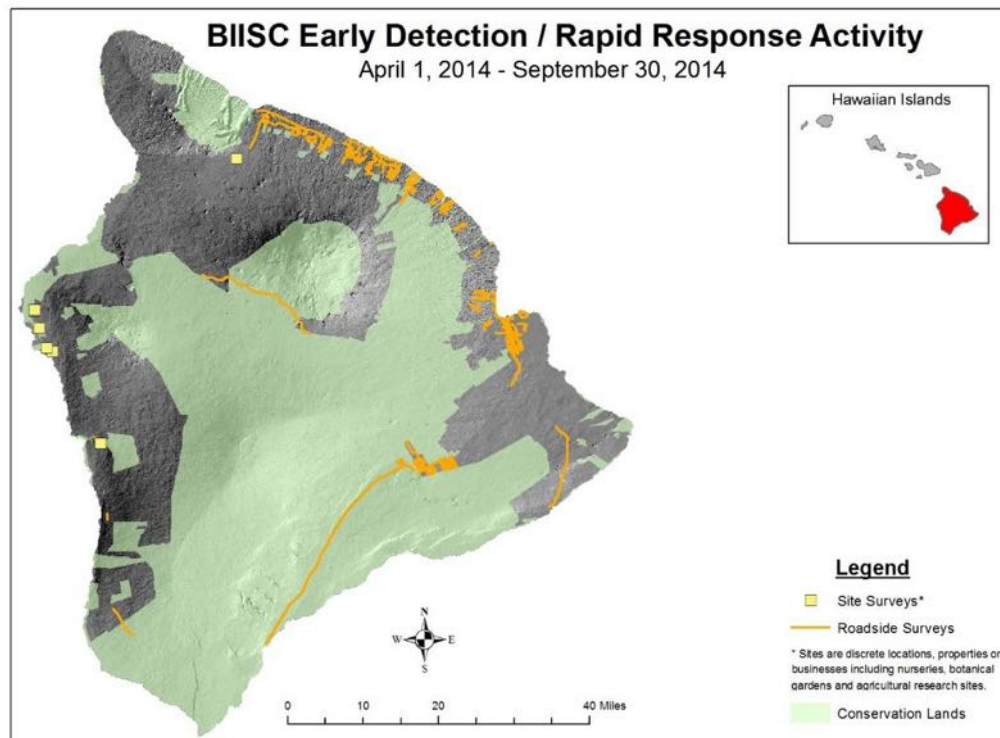
*Objectives (Outreach and Public Relations):*

- Engage and empower communities to participate in and advocate for invasive species control in their own neighborhoods, while developing a positive, relevant BIISC image.
  - BIISC issued a small communications contract, and as a result successfully connected with a range of media outlets to promote volunteer and community training events, and organized high level meetings specific to albizia management.
  - Neighborhood Invasive Pest Projects (NIPPs) were successfully piloted in Kona and Puna. Two new NIPP projects have been initiated in Ka'u and Puna, partially funded by our first-ever direct Hawaii County funding.
  - BIISC hosted the Public Access Room coordinator to conduct a workshop on engaging with lawmakers and providing testimony at the annual Pilina (partnership) forum of conservation programs on the Big Island, with about 200 in attendance.
  - BIISC staff attended at least 34 community events, directly interacting with at least 6,400 people, and produced close to 100 pieces of media, including print, radio, and TV appearances-without any dedicated outreach staff.
- Educate a network of volunteers to expand our early detection capacity and participate in subsequent nursery surveys;
  - Imbedded within the Early Detection Plant Pono Program, discussed above.
- Develop concise, accessible information on target species for our communities.
  - Individual brochures, species identification cards, and species summaries were developed for each target species. Each is available in print and on our website, e.g. [http://www.biisc.org/wp-content/uploads/BigIsland\\_CotPan.pdf](http://www.biisc.org/wp-content/uploads/BigIsland_CotPan.pdf)
  - Links to common invasive pests are also available on the website.
- Develop a professional communications strategy to promote BIISC as an organization and statewide invasive species issues.
  - This deliverable was not met in 2014, in part due to contracting difficulties, and in part due to events surrounding Hurricane Iselle, which itself led to substantial publicity for BIISC and for Albizia management needs.
  - After the initial small contract, RFPs were sent out twice, and twice failed to pass UH procurement rules. The contract has finally been awarded, thanks to assistance from CGAPS coordinator Christy Martin and Franny Brewer. Additional resources from a non-profit funder will ensure that the contract can be carried out and that planned deliverables can be met in 2015.
- Carry-over deliverables include a communications strategy document, targeted marketing packages for at least three target species.
- Deliverables met in 2014 include: One print publication for every BIISC target plant and animal species, radio interviews for at least one statewide priority (albizia), updated website content, and Community Action Plans for 2 NIPP projects.

Early Detection Surveys were funded by HDOT (SNIPP), Kamehameha Schools, the USFS, and HISC.



Surveys support detection of new pests and new locations of old adversaries.



**Project 3: Control and eradication of target species:** HISC funds supported a growing field crew for plant control, starting with six staff, and ending with an 8 person full time, professional crew, 2 full-time Americorps interns (both former unpaid student interns), and 2 part time student hires, and regular volunteers (Total: 10.5 FTE, 8.6 average for year). The team spent 7,677 hours controlling 64,879 plants of 16 species on 2,713 acres (foot surveys only).

2014 was the first in many years that a complete annual work plan, with specific survey objectives was prepared. These objectives included 6800 acres of land surveys on 4,405 individual properties. It was estimated that 10 full time field crew (10 FTE) were needed, dedicated only to the six target species, to meet survey objectives. Though we averaged 8.6 FTE, only 45% of BIISC funding in 2014, primarily that from HISC, directly funded work on eradication target species. Although we spend significant effort seeking funds that can be used on target species, most of the additional funding BIISC received was for provided as fee-for-service agreements for invasive species management on partner lands, for example, miconia control on Hawaii National Guard training areas. This left the program significantly short of the capacity needed to cover the primary work plan, and explains why general funds received through the HISC are so important to achieving our mission.

To manage the shortfall, BIISC partnered up, recruited interns and volunteers, and dropped Wax Myrtle from an eradication to a containment goal. BIISC will limit future wax myrtle survey work to UAV detection efforts within the 3,000-acre search area, and control work to the mauka sections of the infestation. Another target, Buddleia, was put on hold, for additional vetting and mapping, until a clear picture of the species distribution and history could be laid out. Work was then focused on four remaining species with the greatest eradication potential. Cotoneaster control was focused in the Kulani Prison/Puu Makaala NAR area with assistance from Three Mountain Alliance and the Natural Area Reserves staff. Breaking from tradition, all three crews focused on the core population, to suppress the population before the prison was reopened and access could become uncertain. We took a surgical and strategic approach to ruling out unnecessary search areas, and completed 100% of required surveys for three of these within the 14 month period covered by this grant. As previously mentioned, Pampas Grass and Pereskia are now down to single-digit populations, on 3 properties, and were moved into Phase 3 (Monitor), and the 70 locations of Rubbervine were moved from Phase 1 to Phase 2 or 3, with all initial surveys complete and all known mature plants controlled.\* \*two recalcitrant land owners maintain cultivated plants in an urban setting. Work has resumed on Buddleia, and we expect to cover 100% of the survey area in 2015.

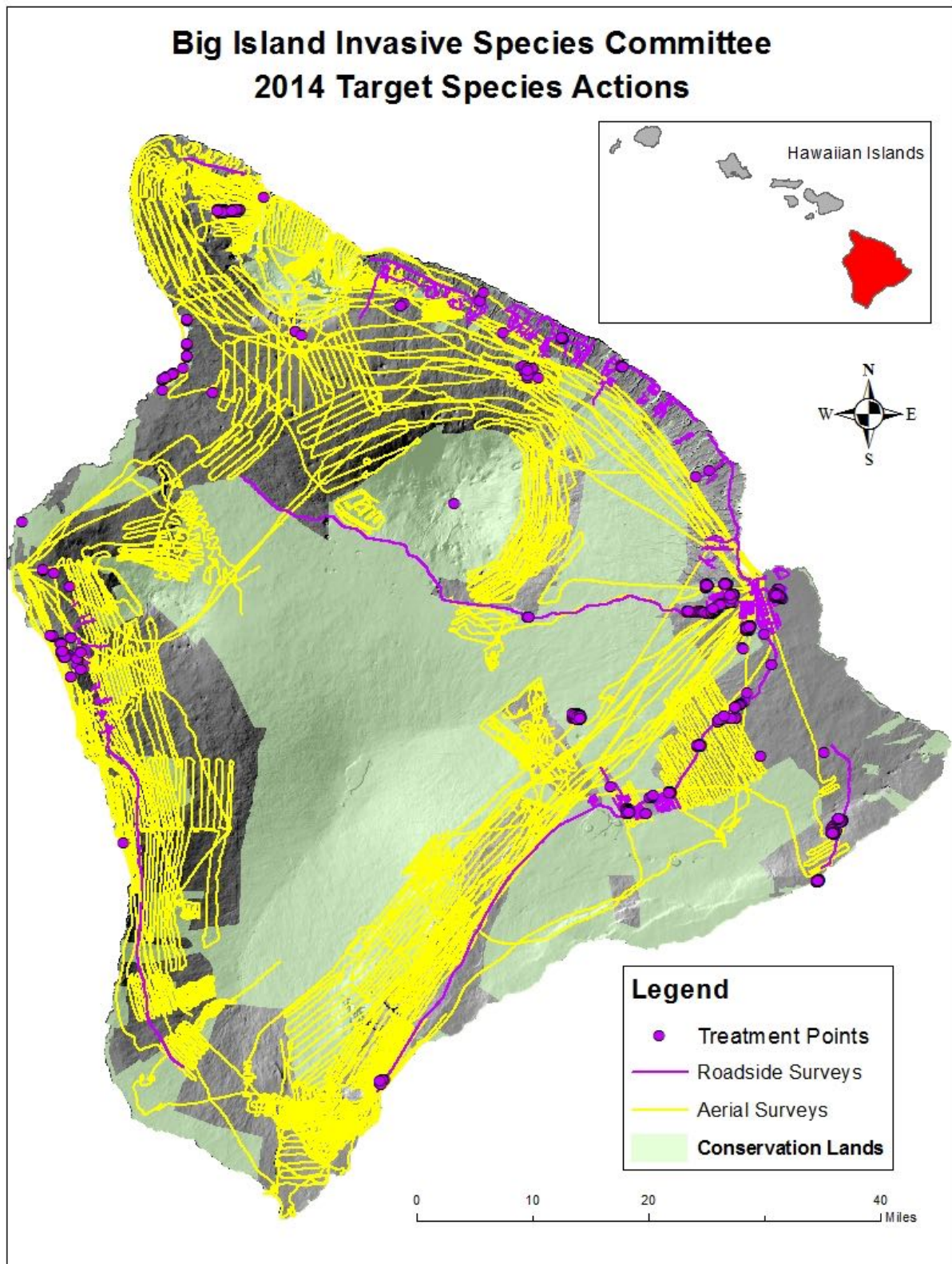
The additional HISC funds awarded for 2015, along with dedicated federal, county, and private funds for an albizia team, will allow BIISC to cut back on fee-for-service agreements and focus 71% of field crew time on target species eradication in the coming year. With two years of reliable data now collected, we have more accurate estimates of survey rates, and expect to survey no more than 2500 acres for all plant target species, including contract work.

\*Two recalcitrant land owners maintain cultivated rubbervine plants in a relatively low-risk urban setting. BIISC monitors and requests removal annually.

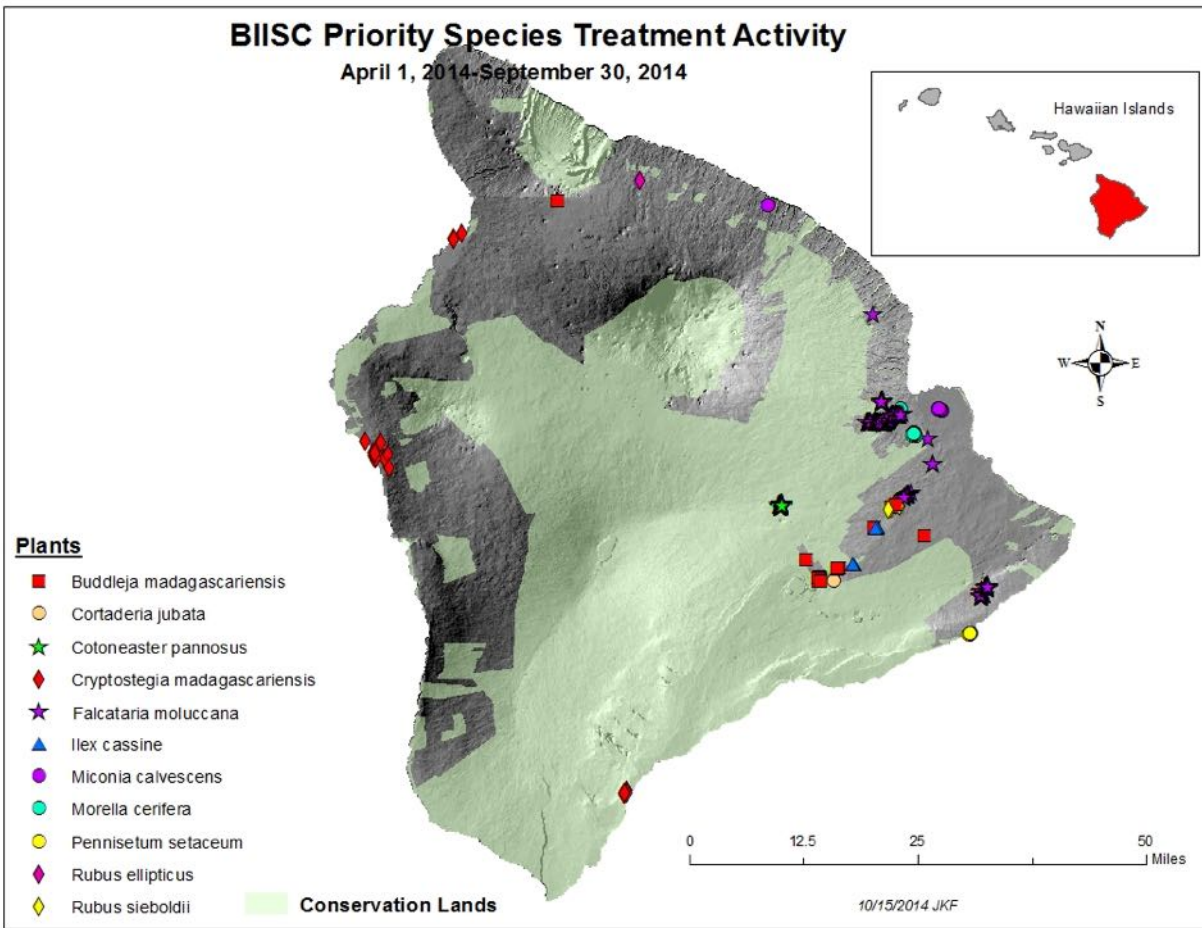


## Target Species Survey and Control Work in 2014

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**Project 4: Albizia Demonstration Project:** With support of the state legislature (HRS 74) and momentum from a 2013 meeting of albizia stakeholders on the Big Island, BIISC coordinated an Albizia Demonstration Project in Black Sands Subdivision, in lower Puna, and on Waianuenue Avenue, the state hospital corridor in Hilo. The project was situated on 500 acres, selected to demonstrate the broad range of challenges, considerations, and potential solutions for albizia management. These included hazard and non-hazard tree control on developed and undeveloped lots, management within and alongside a state forest reserve, along transmission and residential powerlines, and along state & county highways and small private roads.



*Hurricane Iselle? No, these trees fell during a storm with maximum 35 mph gusts, in Jan. 2014, blocking Kulani Road for a whole day. A bill to fund albizia management along emergency access routes failed in the 2014 session. After Hurricane Iselle, SB591, a similar \$2.1 million bill was introduced, along with seven others, seeking albizia control funding.*

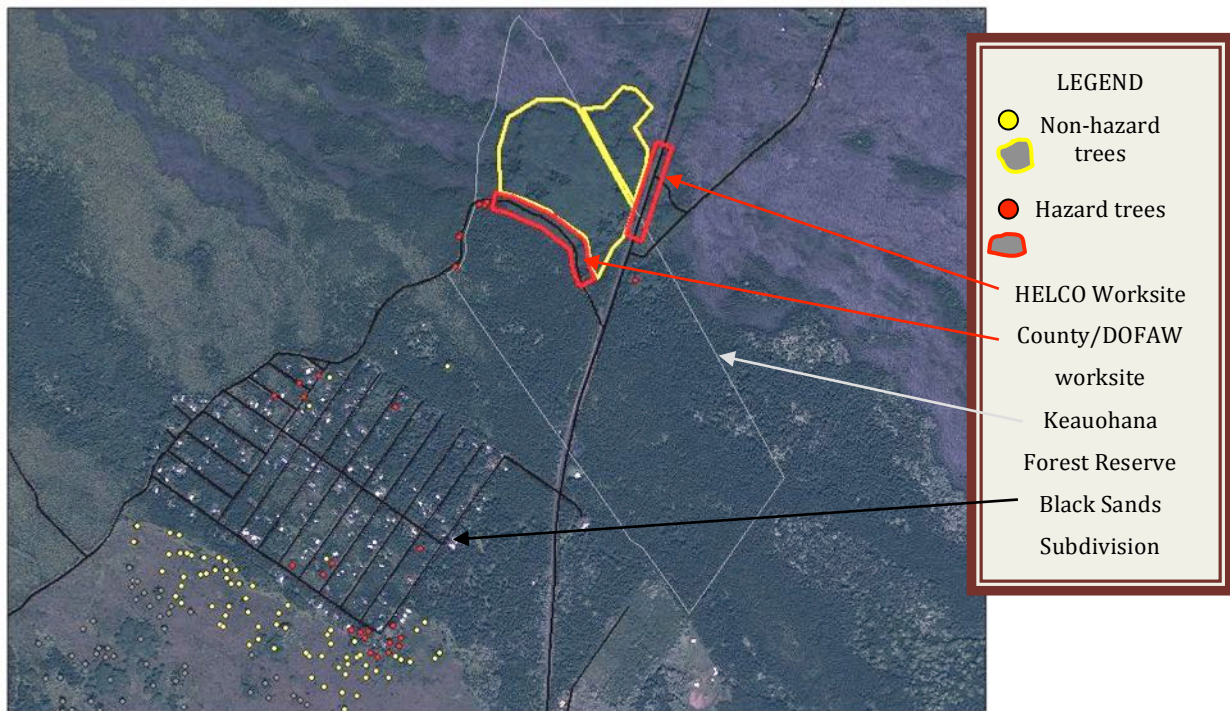
The smaller break-out project on Waianuenue was intended to call attention to and address the risk of road blockage along the one road to Hilo Hospital, the only 24 hour, fully staffed emergency room in East Hawaii, and a busy urban area. A uniquely Hilo situation: this urban parcel, bounded by narrow streets and fast moving traffic was occupied by albizia, and cattle.

Although BIISC received \$35,000, the work was projected to cost \$200,000, making real partnerships a priority for this project. Now nearly complete, though slightly scaled back, the project has received additional cash funds from the Hawaii Tourism Authority (\$14,000) and US Forest Service (\$20,000). The remaining work included in-kind services from HELCO (\$69,000), DOFAW (\$5,000), Hawaii County (\$5,000), USFS Staff, and community volunteers, who worked independently and attended volunteer events at a rate estimated at \$4,000 (\$152,000 total). Costs reported from DOFAW and the County appear to be modest estimates of labor costs, considering their large contribution to the project, clearing hazardous trees from a county road running through the state forest reserve. This partnership of state and county was particularly favorable. County highways staff reported that they had believed they could not cut the trees, because they were in the forest reserve, while DOFAW staff believed they couldn't drop trees onto a county road. Working together, the road and the forest are now nearly albizia free, and federal and county funds will help finish the job.

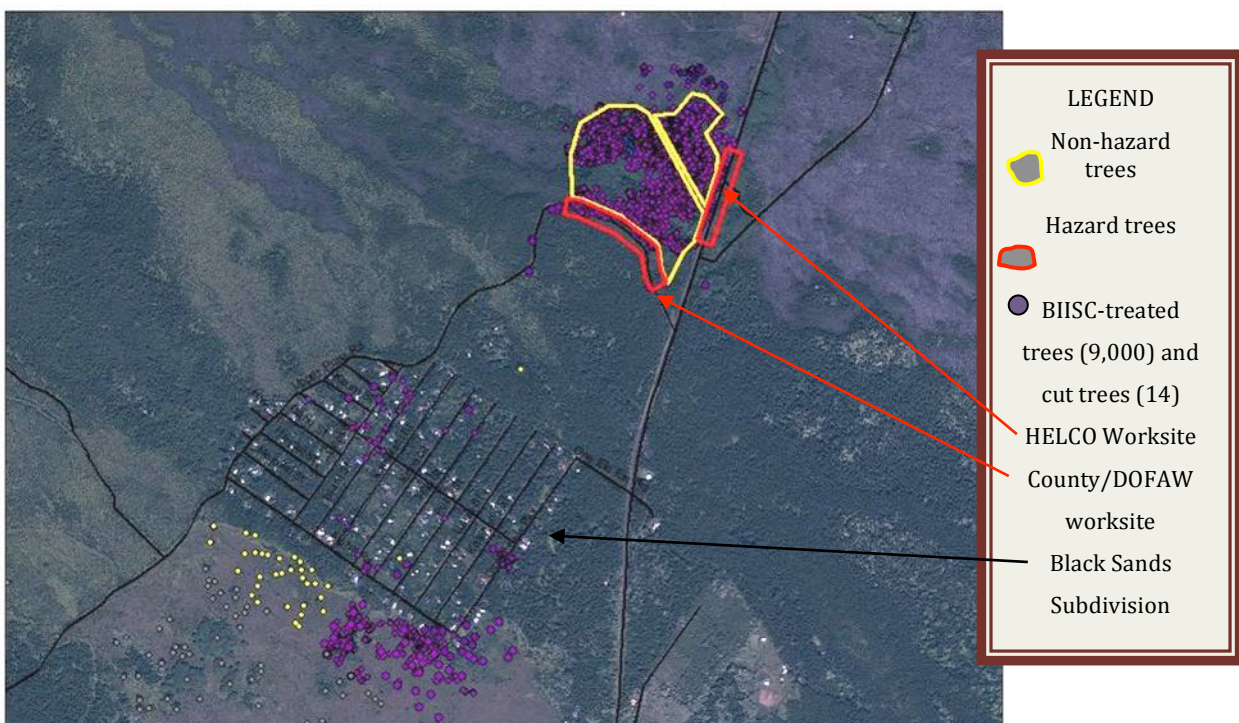
In addition to direct control work, BIISC staff and contractor worked steadily to raise awareness, getting albizia on TV, on the radio, on the front page of the Tribune-Herald, and on the agenda at county and state meetings. We presented to the Hawaii County Emergency Management Center, as they launched their multi-agency preparations for the 2014 hurricane season. Unfortunately, the EMC was engaged in preparing for hurricane season, and offered to assist with recommendations in the fall.



Initial Scope of Work (scaled back from 500 m to 200 m buffer zones around subdivision to match available funds): Far more trees were found in the subdivision during ground surveys, however, volunteers did not carry GPS units.



Completed work (FY14 funds): Purple points are clusters of albizia trees treated. Living hazard trees in the subdivision were removed. Several that had been treated previously using Garlon were rotten, and could not be safely cut.





Funds had been expended and about ¾ of the work completed on the demonstration project when Hurricane Iselle struck, just days after BIISC Chair Flint Hughes (USFS) gave a presentation on the project and need for proactive management at the Hawaii Conservation Conference. BIISC had taken UAV photos of the project site just prior to the storm, and was able to document that the herbicide-treated trees did not fall during the storm, in Hilo or Puna. In fact, in all of Black Sands subdivision, only one albizia struck a home, a marked hazard tree scheduled by the project to be cut down. It had been awaiting the arrival of the arborist contractor for months. In Hilo, while dead, treated trees near Hilo Hospital remained standing, a few blocks away, the Piihonua Electrical Transmission Line was buried under a mile of fallen, live, albizia (HELCO, pers comm.).



At left, Keauohana c. 2010. The albizia canopy spreads like a tide across lowland native Ohia forest. Upper Puna Road is just visible at lower left and center top of photo. At right, in June 2014, prior to the storm, trees felled by DOFAW crews lie neatly along Upper Puna Road. About a dozen living trees remained along the county road, several falling across the road during the storm.



After the storm, the forest is little changed (Left). Dry canopy branches have thinned and a few live trees fell across the road, leaving about a dozen for the DOFAW/County team to cut in 2015. At right, trees along Hwy 130 transmission lines got a "hard trim" from HELCO contractors, before being given the all clear to treat with herbicide by a certified risk assessor. This part of Puna was protected from the worst of the hurricane by a ridge to the north. A more direct comparison was found along the Piihonua transmission line in Hilo, which was buried under a mile of fallen albizia, while treated trees nearby stood fast (no photos taken).

Objectives of the project were met, and far surpassed BIISC's expectations. Large stands of albizia on undeveloped lands across East Hawaii are being treated by private landowners, who frequently call for instructions and are provided safety briefings. Due to our well-publicized efforts, Senator Brian Schatz tapped BIISC to coordinate an albizia technical working group. Having a US senator call a series of meetings gave the team access to the kind of decision makers and expertise needed to move a strategic plan forward, including the president, forester, and legal council at HELCO, County Highways Division and legal council, certified arborists, administrators of the Land Division and DOFAW, and state and county civil defense teams.

A number of significant cost factors and legal concerns were identified during meetings. Factors that significantly increase costs, but are not always necessary, include

- Transportation of cut material can be 30-50% of the cost of the job, but material may often be left on site, whole or chipped.
- Trees are often scheduled to be completely cut, but a hard trim may be sufficient to remove the hazard prior to treatment with herbicide. Savings vary widely.
- Trees that are trimmed but not treated with herbicide grow rapidly back into the easement, and continue to serve as seed banks. Treatment with herbicide costs approximately 1% of the cost of removal by an arborist (for typical large trees in rural areas).
- Private residents should always check that an arborist is ISA certified and insured, but need not require a contractor's license. Obtaining a costly contractor's license can be a significant barrier to new arborists who can compete on price, and does not guarantee qualifications.
- Public agencies must require certification, insurance and a contractor's license, but need not require a bond. Very few arborists in the state carry a bond, which is expensive to maintain. Obtaining a bond may take weeks, disenfranchising many from bidding on state contracts. The lack of competition, in addition to the extra costs of the bond, may be driving up prices.
- Contracts may include a number of contingencies, intended to ensure safe, quality work. In fact, licenced, certified arborists can be expected to reliably carry out safe, quality work. Their lives and their businesses are always on the line. Both contingencies and bonds tend to drive up the price of tree work in direct proportion to the damages the contract is hoping to protect against. Essentially the purchaser of the contract is paying up front on every job, for damage that may never occur on any single job.
- While these factors affect costs, there are other competing factors that may explain why they are necessary for some agencies or some instances.

Legal concerns primarily involved dealing with recalcitrant land owners, however, working group members agree that there are very few who will protest removal of their albizia. Concerns included:

- Hawaii County and State Civil Defense Agencies both now have programs to remove hazard trees and recover costs from unwilling landowners by putting a lien on the property. Neither process has been tested in the courts.
- Liability is a concern for all landowners. Current precedent makes the person who creates a hazardous condition liable for ensuing damage. Certification of hazards is typically done by a certified risk assessor, on an individual tree-by-tree basis. Having an entire species classified as a hazard has not been done, however, arborists propose this is appropriate in the case of albizia. Language has been provided, and the Urban Forestry Program has been involved in finding a way to establish that albizia are in fact, safer dead than alive.
- Liability works both ways. States and cities on the mainland have settled liability suits in the tens of millions for falling tree branches that have crippled or killed citizens. Higher awards



seem to be granted for suits in which the owner of the tree clearly had knowledge of the hazard, for example a citizen complaint was logged or an arborist contract awarded, but not fulfilled.

- Residents seem to be responding to the perceived threat of personal liability as neighbors make use of civil defense processes to document and report hazards, and are actively having albizia trees cut down.

Intending to create a document that would be read by decision makers, the group met weekly for 8 weeks, and produced a one page budget and one page project summary. The plan briefly outlines a strategic approach focused on transportation and electrical transmission corridors, minimizing arborist work, and emphasizes herbicide treatment of trees where appropriate, and maintenance of understory vegetation to suppress regrowth. HELCO, County Highways Division, and HDOT each identified their top priority roads, and were asked to consider both their most costly maintenance and safety concerns, and emerging satellite populations of albizia where the cost is still minimal. Rich Wlosinski of HELCO and private arborists donated their time to estimate costs along these priority roads. Ignoring artificial boundaries like the width of roadside easements, all hazard trees within striking distance of infrastructure were considered. Costs for remaining non-hazard tree control (chemical control) were then applied, along with estimates of public outreach needs to conduct the work across public-private land boundaries.

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***Additional Information about BIISC operations:***

**Protecting the Biggest Island:** The Big Island is larger than all of the other islands combined, in fact, if the state were a jig saw puzzle, one could pick up Oahu and place it on the Big Island six times, with ample space left over. One could place Maui on the Big Island five and a half times. It is home to more than 70% of the state's Strategic Forest Reserves, and more than half the State Important Agricultural Lands, and has a significant share of the state's nursery and horticulture business. BIISC receives similar levels of state and federal funding as these smaller islands.

To achieve operating efficiency, BIISC should base additional 5-person field teams in Ka'u/South Kona, and Kohala. Expansion to this capacity could be accomplished with an additional \$500,000 for salary, equipment, rental space, and supplies for each new team. If facilities could be obtained from the College of Tropical Agriculture and Human Resources in Waimea and Captain Cook, the expansion could be accomplished for approximately \$380,000 each. The amount of land managed per staff member will remain significantly greater than that found in any other county.

**The next new threat and the threat next door:** The most cost effective way to eliminate an invasive species is to catch it before it is widespread, which is why the invasive species committees focus on early detection targets. When our most injurious invasive species are already widespread, however, a failure of the invasive species committee to act is conspicuous. BIISC has found value in training community groups in invasive species identification, management, and advocacy, focused on pests they know.

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