



Albizia Hazard Mitigation Plan

2017 IMPACT REPORT





KĀKOU!

EXECUTIVE SUMMARY



Aloha kākou!

Thank you for taking the time to explore our 2017 Impact Report on the progress of the Albizia Hazard Mitigation Plan. More than a dozen government and non-governmental entities, hundreds of community volunteers, now known as the Albizia Assassins, and political leaders at every level of government have come together to coordinate, fund, and implement the eighteen projects that make up this plan!

As we enter Year 3, we are very proud to say that **nine of the eighteen planned projects are completed**, or are just being wrapped up. Two big projects are funded and underway for 2018, and funding proposals are being submitted to multiple partners for 2019, which will be the fourth year of the project.

That we are still going strong three years after Tropical Storm Iselle says a great deal about the perseverance of our Big Island communities and the commitment that the State Legislature and other project partners have made to secure our island infrastructure and prevent a repeat of the calamity caused by falling albizia in 2014.

Our cover photo shows commuters on the Puainako Extension of Saddle Road, giving their laulima to remove a fallen albizia so they can all get on with their day. Because the road is owned by the County, but built and slated for transfer to HDOT—pending half a million dollars of albizia control work on private lands bordering the road—I honestly thought we might never negotiate a solution. The project broke ground in September, 2017, and is expected to be completed by March 31st, 2018. The aloha and laulima of our partners truly has made this project “a kākou thing.”

—Springer Kaye, Project Manager



PROJECT PARTNERS AND SPONSORS

The success of this project has been possible thanks to the hard work and generous financial and in-kind support of a large number of sponsors and direct participants.

All the Albizia Assassins

Big Island Invasive Species Committee

*Big Island Resource Conservation and Development
Council*

Hawaii County

*Councilmembers Gregor Illagan, Eileen O'hara
Civil Defense*

*Department of Public Works-Highways
Research & Development Department*

*Hawaii Department of Transportation,
Highways Division*

Hawaii Division of Forestry and Wildlife

Hawaii Electric Light Company

Hawaii Invasive Species Council

Hawaii Island United Way

Hawaii Tourism Authority

Hawaiian Paradise Park Owners Association

Michael Kraus, Certified Risk-Assessment Arborist

National Fish and Wildlife Foundation

Pacific Internship Programs for Exploring Science

Piihonua Action Committee

Representative Tulsi Gabbard

State Legislators Russell Ruderman, Richard Onishi

State Legislative Grant-in Aid Program

Senators Brian Schatz, Mazie Hirono

University of Hawaii

*College of Tropical Agriculture and Human
Resources*

Pacific Cooperative Studies Unit

USDA Forest Service

Institute for Pacific Islands Forestry (USFS)

State and Private Forestry Program

21st Century Conservation Corps



HAWAII ELECTRIC LIGHT COMPANY

HELCO was one of the first partners to embrace the value proposition of the albizia mitigation program, assisting with our first two pilot projects, in Black Sands, Puna, and the Hospital Corridor (Waiuanuenu) in Hilo. HELCO understood the opportunity to **avoid future costs** that were accruing in the millions.

So before HELCO was hit with the tremendous cost of rebuilding after Tropical Storm Iselle, the power company was testing ways to better deal with the routine annual storms that knock out power all across Puna and Hilo. HELCO changed the way residential power lines are connected, so that when a tree falls on a wire, only a small section loses power. They changed their contract language to **require that arborists treat albizia stumps with herbicide** to

prevent re-growth, and now require a 1-year guarantee: If the stumps aren't treated the contractor must go back and address any regrowth for a year!

Major transmission lines carry power long distances—they can't break away like the residential lines can—so when they are hit, vast areas can lose power. It is costly and time consuming to repair these lines, as 30,000 residents of Puna learned in 2014.

For the mitigation plan, HELCO selected four major transmission lines with an estimated 2015 cost of over \$10 Mil as their top priorities. **All four HELCO projects are now complete!** All other transmission lines that follow the priority state highways and county roads have also been effectively managed for albizia, giving these agencies a good head start.

HELCO - HAWAII ELECTRIC LIGHT CO., LTD. ALBIZIA TREE MANAGEMENT SUMMARY						
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
		No. 1	No. 2	No. 3	No. 4	TOTAL: 61 Miles or 454 Acres
HELCO TRANSMISSION LINES		PIIHONUA 7400 12 Mile or 93 Acres	NANAWALE 6500 29 Miles or 214 Acres	LEILANI 8700 18 Miles or 131 Acres	KAUMANA 9200 2 Miles or 16 Acres	TOTAL COSTS:
ALBIZIA COST ESTIMATES December, 2015	YEAR 1	\$790,977	\$1,714,234	\$1,040,148	\$127,781	\$3,673,140
	YEAR 2	\$560,160	\$1,221,214	\$742,563	\$92,725	\$2,616,662
	YEAR 3	\$380,327	\$837,265	\$510,850	\$65,465	\$1,793,907
	YEAR 4	\$256,712	\$573,580	\$351,769	\$46,801	\$1,228,862
	YEAR 5	\$194,876	\$442,055	\$272,503	\$37,581	\$947,015
	TOTAL TREE MANAGEMENT COST:	\$2,183,052	\$4,788,348	\$2,917,833	\$370,353	\$10,259,586
PERCENT COMPLETION AS OF December 31, 2017		100%	100%	100%	100%	



**61
MILES**

**45,000
TREES**

**100%
COMPLETE**

The first mile of the Piihonua Transmission Line, completed in 2015. Photo courtesy of Rich Wlosinski.



HAWAII DEPARTMENT OF TRANSPORTATION, HIGHWAYS DIVISION

There are over 400 state highway miles on the Big Island, and many run through undeveloped forests or agricultural lands. Native forests and sweeping roadside vistas have gradually been overwhelmed by stands of enormous albizia across East Hawaii.

Facing historic costs of up to \$1Mil/mile for mitigation, constant regrowth, and an uncomfortable relationship with environmental groups, the Highways Division on Hawaii Island was ready for a new set of solutions. Techniques developed by the 2014 Albizia Task Force members have proven effective, at a reduced average cost of \$150,000 per mile!

HDOT secured funding from the state legislature to begin the five state projects included in the plan in FY 16 and 17. HDOT contracted HELCO to manage

the first year of hazard albizia removal, and BIISC to complete the herbicide treatment of non-hazardous trees. These agreements provided a vehicle for all three organizations and Hawaii County to learn from one another's strengths and share resources to make progress on the plan.

In 2017 HDOT encumbered the last of the legislative appropriation to begin hazard removal from the Puainako Extension of the Daniel K. Inouye Highway (Saddle Road).

To date, four of the five state projects are complete, and work on the Hilo Airport Road will begin in early 2018. Additional funds may be needed to complete Year 4 and 5 tasks for Hwy 130 and the Airport Road.

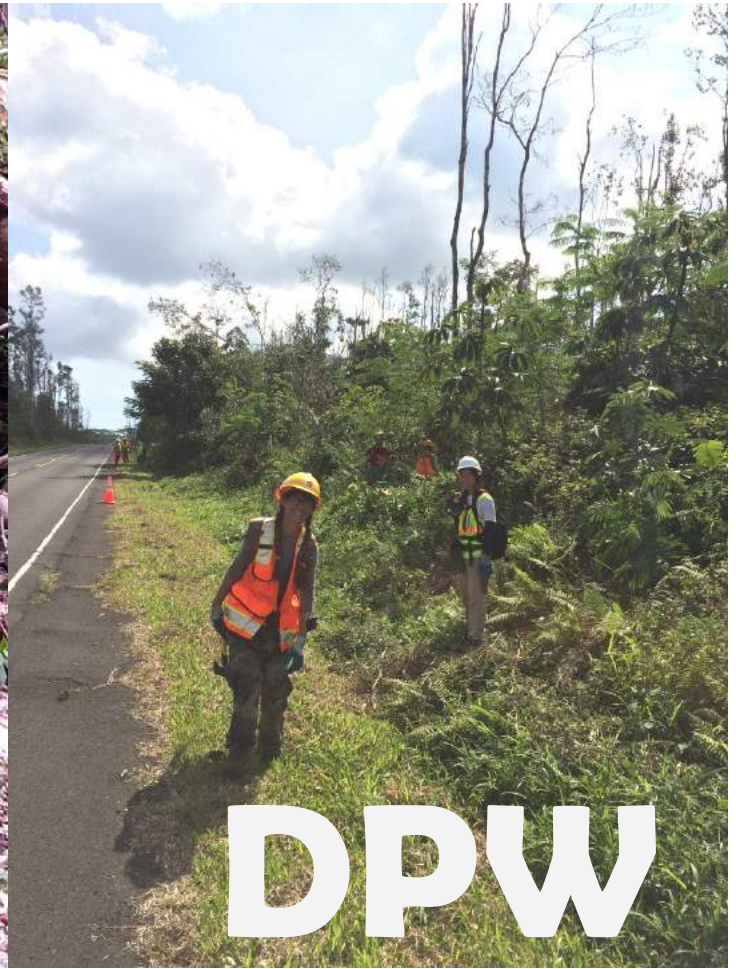
STATE HIGHWAYS DIVISION ALBIZIA TREE MANAGEMENT SUMMARY							
		✓	✓	✓	✓		
		No. 1	No. 2	No. 3	No. 4	No. 5	TOTAL: 58 Miles or 295 Acres
STATE HIGHWAY CORRIDORS		PUAINAKO ST RTE 200 1 Mile or 9 Acres	HAWAII BELT ROAD ROUTE 19 15 Miles or 117 Acres	KEAAU-PAHOA RD ROUTE 130 25 Miles or 117 Acres	MAMALAHOA HWY ROUTE 11 15 Miles or 87 Acres	HILO AIRPORT ACCESS ROAD 2 Miles or 14 Acres	TOTAL COSTS:
ALBIZIA COST ESTIMATES December, 2015	YEAR 1	\$97,314	\$1,091,367	\$1,254,395	\$453,409	\$106,389	\$3,002,874
	YEAR 2	\$68,415	\$763,500	\$903,136	\$346,809	\$77,762	\$2,159,622
	YEAR 3	\$45,888	\$507,835	\$629,812	\$264,356	\$55,516	\$1,503,407
	YEAR 4	\$30,386	\$331,786	\$442,419	\$208,526	\$40,303	\$1,053,420
	YEAR 5	\$22,606	\$243,228	\$349,454	\$181,944	\$32,820	\$830,052
	TOTAL TREE MANAGEMENT COST:	\$264,609	\$2,937,716	\$3,579,216	\$1,455,044	\$312,790	\$8,549,375
PERCENT COMPLETION AS OF December 31, 2017		80%--Completion scheduled for 2018	90%--Completion scheduled for 2018	85%	100%	50%	

Black check marks indicate completed projects.

Grey checkmarks indicate projects within 85% of completion and identified resources.



Seasoned BIISC crew members train the new albizia recruits. You can tell the experienced staff by their head wraps—worn to protect against little fire ants. *Photo credit: Bill Buckley, BIISC Albizia Coordinator.*



HAWAII COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAYS DIVISION

Hawaii County owns at least 80 miles of roads impacted by albizia. County responsibilities include **maintaining emergency access routes**, some of which pass through dense albizia forests, **protecting citizens from immediate hazards** to their homes, lives, and property, preventing new albizia-infested areas from taking hold in the wake of development, and **managing re-growth** following Tropical Storm Iselle.

To manage all these responsibilities, DPW cooperates with other skilled partners like the Hawaii Division of Forestry and Wildlife (above left), BIISC, and community associations and volunteers (above right), contributing resources like heavy equipment and operators to albizia removal projects, and hiring certified arborists to deal with immediate hazards. Priorities are closely coordinated with HDOT, HELCO,

and BIISC to **increase efficiency**.

49 miles along nine routes in S. Hilo and Puna were selected as County priorities in this plan. In 2017 Hawaii County contributed \$600,000 to a variety of hazard tree removal efforts, including projects in this plan, addressing individual albizia hazard complaints, and managing other roadside problem trees. The first complete county project, the clearing of Puainako Extension, broke ground in Sept., 2017, and should be completed by the end of January. The Hilo Landfill Road will follow immediately afterward.

Projects scheduled for 2019 are marked with green arrows on the chart on the following page. The County Department of Public Works is continuing to work with the Mayor's office and the Hawaii County Council to ensure that funding is made available to complete each project on the list.

COUNTY OF HAWAII HIGHWAYS DIVISION ALBIZIA TREE MANAGEMENT SUMMARY											
		✓	2019		✓		2019		✓	✓	
COUNTY CORRIDOR NAME		No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	TOTAL: 49 Miles or 226 Acres
		PUAINAKO EXTENSION ROUTE 200 1 Mile or 9 Acres	KAHAKAI BLVD 6 Miles or 28 Acres	POHOIKI ROAD 5 Miles or 18 Acres	KAPOHO ROAD RTE 132 8 Miles or 37 Acres	LEILANI AVE 4 Miles or 25 Acres	WAIANUENUE 2 Miles or 8 Acres	RAILROAD AVE 7 Miles or 30 Acres	MAKUU ST 8 Miles or 37 Acres	HILO LANDFILL 4 Miles or 21 Acres	TOTAL COSTS:
ALBIZIA COST ESTIMATES December, 2015	YEAR 1	\$204,169	\$266,545	\$145,423	\$342,947	\$261,100	\$67,206	\$270,175	\$342,947	\$202,354	\$2,102,866
	YEAR 2	\$143,122	\$186,157	\$103,826	\$240,104	\$180,549	\$48,010	\$189,896	\$240,104	\$141,253	\$1,476,021
	YEAR 3	\$95,525	\$123,465	\$71,437	\$159,912	\$117,688	\$33,064	\$127,316	\$159,912	\$93,600	\$981,919
	YEAR 4	\$62,760	\$80,285	\$49,200	\$104,699	\$74,335	\$22,804	\$84,252	\$104,699	\$60,776	\$643,810
	YEAR 5	\$46,292	\$58,549	\$38,121	\$76,934	\$52,421	\$17,693	\$62,635	\$76,934	\$44,249	\$473,828
	TOTAL TREE MANAGEMENT COST:	\$551,868	\$715,001	\$408,007	\$924,596	\$686,093	\$188,777	\$734,274	\$924,596	\$542,232	\$5,675,444
PERCENT COMPLETION as of Dec 31, 2017	Funded, underway. To be completed in February 2018	20%	0%	80%	20%	10%	0%	FUNDED. SCHEDULED FOR 2018	FUNDED. SCHEDULED FOR 2018		



The famous Tree Tunnel that once enclosed County Hwy 132 (above) was a frequent source of motor vehicle hazards and obstructions. A moving vehicle suffered a direct hit from a large branch not long before Tropical Storm Iselle mowed down albizia throughout the area. Arborists spent weeks cleaning up the damage, and the plan calls for additional tree removal, still ongoing. The sunny eight mile road is no longer recognizable (upper right, facing page). Since the storm, Albizia Assassin volunteers led by BIISC gather twice a year to maintain the albizia-free corridor, killing over 2,000 sapling trees each workday.



BIG ISLAND INVASIVE SPECIES COMMITTEE

The Big Island Invasive Species Committee (BIISC) has planned, coordinated, fund-raised and publicized the project since its inception. Our albizia crew has played a critical role in each project. Because the public rights of way (ROW) are narrower than the albizia are tall, and some albizia stands extend across large distances, a significant portion of the work must take place on private land. BIISC staff take the lead in negotiating with landowners for private property access, which is strictly voluntary under current rules. The typical safety buffer created is 100 meters from each side of the road, removing every albizia that could strike the road, and treating with herbicide remaining trees to reduce the rain of seeds into the right away—**creating a long term, cost effective solution to the albizia problem.**

Over the life of the project BIISC staff and volunteers have treated over 120,000 trees. After an 8-month lapse in funding in 2017, we secured a state Grant in Aid and HDOT Funds and hired a new crew of nine and an outreach assistant dedicated to working with the landowners on the project route.

Our greatest contribution to the project may be the Albizia Assassins. These are neighborhood teams that formed after attending hands-on BIISC trainings, then work to control emerging stands of young albizia and encourage neighbors to remove hazardous albizia threatening their communities and infrastructure. Their efforts will prevent future hazards, preserve property values, and demonstrate the commitment of each neighborhood to participate.



**600+
VOLUNTEERS**

**120,000
TREES**

**16,000
FIELD HOURS**



The Albizia Assassin teams in some communities like HPP, Ainaloa, and Kalapana Seaview, are highly organized. Coordinators have painstakingly mapped and secured access to the albizia trees in their neighborhood and have raised their own private donations to fund their efforts. Other volunteers join monthly BIISC work days, or divide and work solo to keep their street or block albizia free—through physical labor or letter writing campaigns. Whichever approach they are using, the Albizia Assassin teams are making an impact!



Reclaiming agricultural land from albizia infestations is costly and time consuming...but it can be done. Degraded sugar cane lands suffer from loss of carbon and nitrogen after decades of use. These same lands were overtaken by nitrogen-producing albizia after the collapse of sugar cane. Though expensive, grinding the trees up and spreading mulch on-site or across nearby farmscapes produces carbon- and nitrogen-enriched soil that can rightly be called “Black Gold.” University of Hawaii Hilo graduate student Joanna Norton is conducting trials to measure the potential costs and benefits to farmers. Almost all work in this area has been privately funded, by individual farmers and by philanthropic organizations.

Agriculture



Nitrogen may be great for farming, but along roads and river gulches, albizia’s excess nitrogen runs off into streams where it is a strong, regulated pollutant. USDA Forest Service Researcher Dr. Flint Hughes monitors the ecological impact of the hazard mitigation work, and measures the rate at which the herbicide-treated trees break down. His studies will help ensure that the project has a net positive impact on the environment. It will also tell highways maintenance crews and landowners how soon they can expect to make good use of the land again and what further maintenance might be needed. So far the news is very good! After just a few years the decaying albizia canopy melts away, nitrogen inputs drop, and a rich understory of manageable grass and shrubs takes the albizia’s place.



Environment



Decay Class	leaves	twigs	branches	limbs	trunk	Time since Treatment
1	present	present	intact	intact	intact	0 months
2	absent	present	intact	intact	intact	6 months
3	absent	mostly intact	intact	intact	intact	
4	absent	mostly broken	mostly intact	intact	intact	12 months
5	absent	absent	mostly broken	mostly intact	intact	
6	absent	absent	absent	mostly broken	mostly intact	18 months
7	absent	absent	absent	absent	mostly broken	
8	absent	absent	absent	absent	absent	

From Hughes et al., 2017: **Figure 5.** Average height of treated (i.e., dead) albizia snags in treatment plots over the course of 18 months (upper left graph), and average progression of tree decay during first 18 months of post-treatment monitoring (bottom table). Photo of typical stand level decay at 6 months post-herbicide treatment (upper center) and at 18 months post-herbicide treatment (upper right).

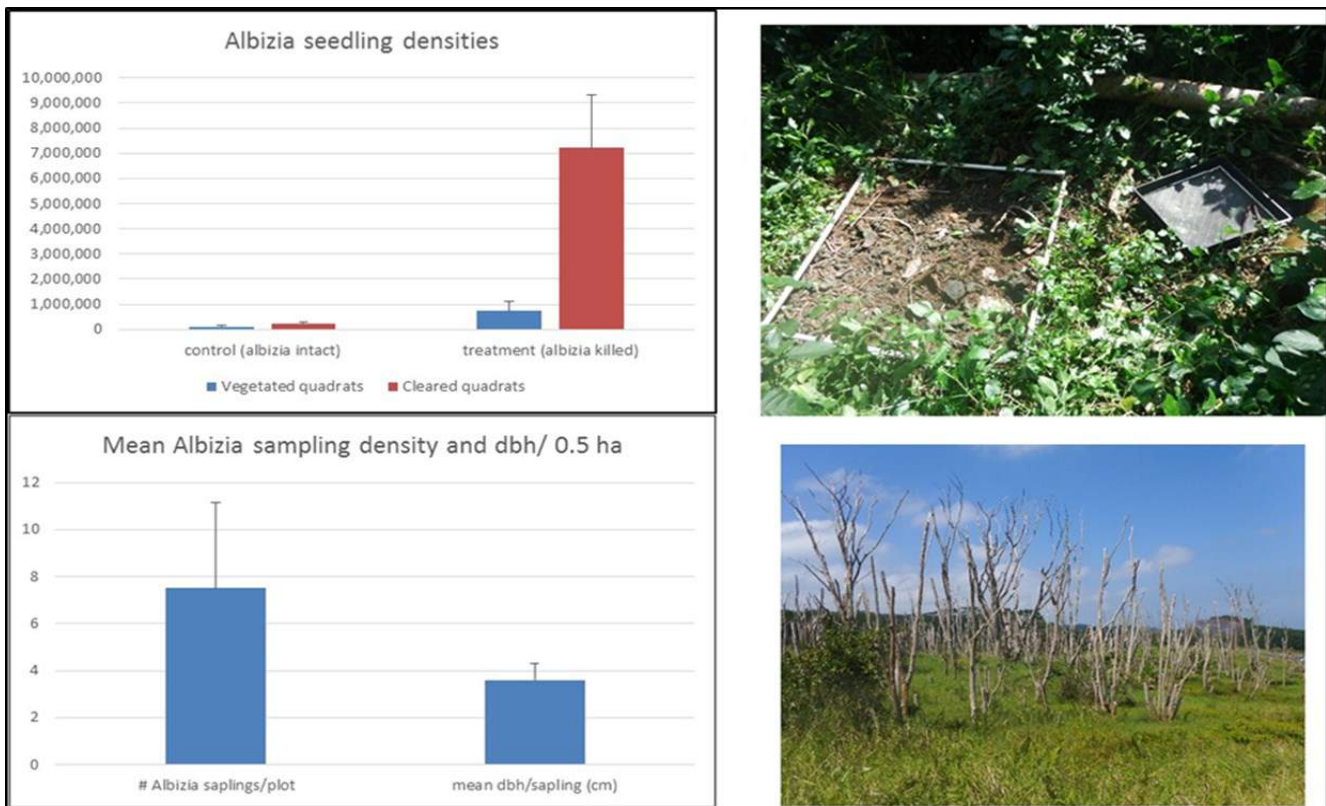


Figure 6. Mean albizia seedling densities in cleared and uncleared quadrats of control and treatment plots (upper graph), and mean densities and diameters of albizia saplings in treatment plots measured one year after herbicide application. Upper graph shows that if the land is cleared of vegetation (i.e. with herbicide or bulldozing) millions of albizia seedlings will develop. The lower photo shows the lack of albizia sapling recruitment in vegetated plots following herbicide application to albizia trees.

Key Lessons:

We have learned a great deal about managing albizia in infrastructure corridors the past five years. The most important lesson is simply that **it can be done!** There are cost-effective, long-term solutions at our fingertips. Now we simply need to find the will to implement them.

Some of the key lessons learned:

1. **Plan for success.** The majority of serious albizia problems are found on lands that were disturbed by construction of infrastructure, and on abandoned lands previously cleared for agriculture or development. Environmental planning for new road and power corridors should include a landscape plan and budget to maintain vegetation capable of suppressing albizia growth—mowed grass or dense, natural vegetation. During economic downturns, abandoned projects become overrun with invasive species. Permit enforcement, tax incentives, and discouraging pin-to-pin clearing may help.
2. **Go big!** Albizia is an aggressive invader that requires an aggressive approach. We've seen what happens when mitigation is limited to individual hazard trees, and cleaning up the damage from storms year after year while the risk and liability grows. Public agencies can now see the value of avoiding future costs by addressing entire stands of albizia, and laying down durable, alternative vegetation.
3. **Cut what you must, and herbicide the rest, where it is safe to do so.** In rural areas, trim only those hazard trees or branches necessary, and leave the cut material onsite to compost. Treat remaining trees with Milestone™ herbicide and leave standing. Herbicide-treated stands cause minimal soil disturbance—allowing alternative vegetation to fill in and suppress the millions of keiki that would otherwise pop up.
4. **Require treatment of stumps with herbicide.** Do albizia grow back from cut stumps? Yes they do! And unless the treatment of stumps with herbicide is included in contract language, it will not be done. HELCO has begun requiring a 1-year guarantee in their arborist contracts as a quality and cost control measure. This is a measure the public agencies should employ.
5. **Partner Up!** The success so far is due to the diversity and generosity of expertise our partners have contributed to the plan and its implementation. Each partner has expanded its resource base by welcoming the contributions of other professionals and community volunteers. Where one agency lacks jurisdiction to work, an agreement with a non-profit or University of Hawaii program may fill the gap. When hands are short, tap community members to take real leadership roles, to take ownership of the problem, for a lasting commitment. Only together can we continue to succeed!





Punaiko Extension in December 2015, January 2018. These albizia flourished in the disturbance caused by construction of the highway in 2001. When finished, all albizia within 100 meters of the road will be gone.



Milestone-treated albizia trees off of Komohana Street in December 2015; January 2018



Hwy 132 before Tropical Storm Iselle, dominated by albizia; and in 2016, after clean up efforts. Ohia trees can now be seen along the road edges.



MISSION

To address the highest risk invasive species threats to the Big Island environment, economy, and way of life.

In all that we do, our guiding principle is public service.

MOTTO

Hoala i ka maka. Healing the land, awakening the people.



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A project of the Pacific Cooperative Studies Unit of the University of Hawaii

Report prepared by: Springer Kaye, January 15, 2018