STRATEGIC PLAN FOR THE CONTROL AND MANAGEMENT OF ALBIZIA IN HAWAIʻI

Hawaiʻi Invasive Species Council, 2018

STRATEGIC PLAN FOR THE CONTROL AND MANAGEMENT OF ALBIZIA IN HAWAIʻI

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Figure 1: Albizia Control
Photo provided courtesy of JC Watson

Introduction

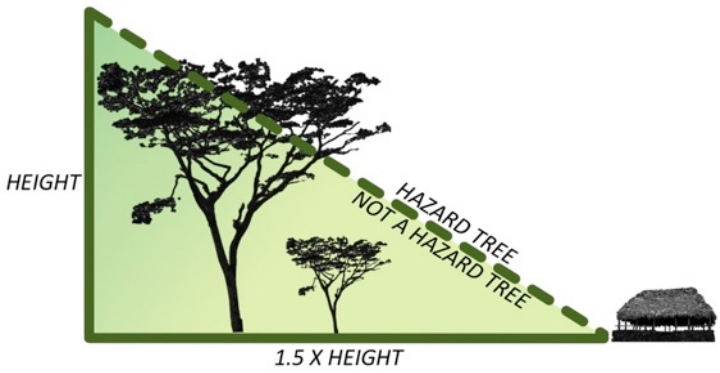
Albizia infests large swaths of our islands. Its rapid growth crowds out native species, its nitrogen fixing abilities change natural ecosystems, and its brittle wood breaks easily, smashing property and destroying lives. Despite being one of the most detrimental plants in our state, there is no coordinated effort to address this invasive species on a statewide scale. In 2013, Senate Resolution SR41-SD1 resolved that the Hawai‘i Invasive Species Council (HISC) create a comprehensive plan for the control of albizia throughout the State. The purpose of this strategic plan is not to provide site-specific management actions but to provide large-scale objectives and a framework to minimize the impacts of albizia on the environment, human health, and infrastructure by:

- Describing statewide impacts of albizia
- Summarizing available control methods
- Recommending directions for future research on detection and control methodologies
- Supporting and encouraging the development of island or site-specific management plans
- Identifying priorities for HISC funding to support research, detection, and control efforts
- Identifying objectives and implementation tasks to reduce impacts of albizia statewide

Albizia in Hawai‘i

Native to Papua New Guinea, Indonesia, and the Solomon Islands, albizia (*Falcataria moluccana*) is a fast growing tropical tree that was introduced to Hawai‘i in 1917 by Joseph Rock as an ornamental plant and for reforestation purposes (Elbert, et al. 2003). Approximately 140,000 albizia were planted in forestry areas throughout the state during the non-native tree forestry planting efforts in the early 20th century. This effort was prior to our understanding of how non-native and invasive plants impact our environment, and at the time albizia was valued for its rapid growth. Albizia is nitrogen fixing which allows it to thrive in nutrient deficient soils and become established in relatively intact native ecosystems. It produces large quantities of seeds, which are encased in light papery pods and can easily be dispersed over large distances. Albizia is also one of the fastest growing trees on Earth, and is capable of growing up to 15 feet per year and easily attain a height of over 35 meters or 100 feet (Hughes, et al. 2011). The rapid growth rate of this species produces a massive number of trunks and limbs that are structurally weak and brittle in nature. Large trees are prone to “sudden limb shear, ” or “sudden branch drop.” This phenomenon is defined as the sudden failure and collapse of live branches with no sign of physical weakness, and without apparent cause (Draper, et al. 2009).

The term "hazard tree" as defined in this strategic plan applies to all albizia trees whose height is greater than eight feet, and are growing within a distance of less than 1.5 times its height from roads, structures, power lines, hiking trails, areas of congregation, or anything of value, and whose failure will impact the aforementioned.



The Hawai'i-Pacific Weed Risk Assessment (HPWRA) scores albizia at eight and is categorized as highly invasive. In 2011, the HISC passed resolution 11-2 resulting in the support of designating albizia as an invasive species. See Appendix no. 1 for complete details.

Fortunately, there are aspects of albizia biology that make large-scale control and management actions feasible. First, seedlings are shade sensitive and mass germination events require that the canopy be open enough to allow ample light to penetrate to the understory layer (Hughes, et al. 2011). Secondly, there are a variety of effective methods that can be employed to control both seedlings and mature trees.

On a statewide scale, there is limited information as to the location and distribution of albizia populations. In 2014, albizia populations on Hawai'i Island were mapped by Julie Gartner using guided classification of 8-band World View 2 imagery. Infested areas were confirmed using Pictometry (high-resolution imagery) and roadside surveys. In addition, a basic analysis of infested acres using aerial imagery was performed for O'ahu for use within this strategic plan. Polygons were created and depict areas that have a dominant albizia canopy. It should be noted that the imagery used to create the coverage map was from 2012, and that additional analyses with more recent imagery may

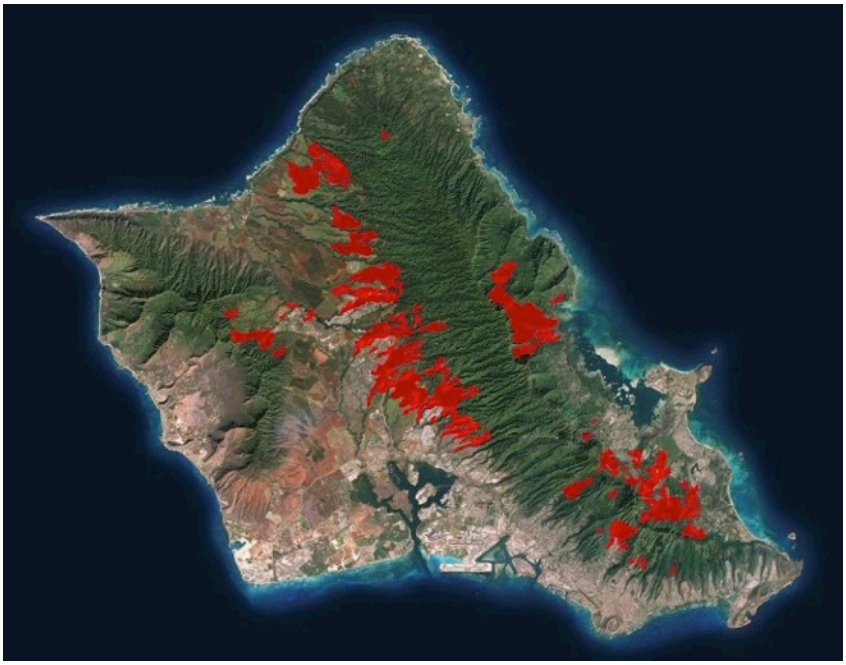


Figure 2: Heavily infested areas on O'ahu with dominant albizia canopy.
Image provided courtesy of JC Watson

assist in implementation of specific control projects. Due to this constraint, the map should be considered to depict the minimum acres of albizia coverage on the specific island. Due to the rapid growth rate of albizia, it is possible that populations of trees reaching heights up to 75 feet in 2017 were not yet detectable using imagery from 2012.

Acres infested on Oʻahu: ~20,000 acres
Acres Infested in East Hawaiʻi Island (provided by Julie Gardner): ~43,000 acres
Hawaiʻi Pacific Weed Risk Assessment score: **8, HIGH RISK INVASIVE**

Impacts

The impacts of albizia are widely known but were emphasized by Tropical Storm Iselle in 2014, when hundreds of Hawaiʻi Island residents were stranded for days with their roads blocked and without power for months due to downed albizia trees. Hawaiʻi Electric Light Company (HELCO) estimates that it spent $13.7M responding to damage from Iselle, and the Hawaiʻi Island branch of Hawaiʻi Department of Transportation (HDOT) estimates that 90% of all received calls about fallen trees for the past several years have involved albizia trees (BIISC, 2015). However, Hawaiʻi Island is not the only island where albizia-related hazards threaten residents. Stands of large albizia can be found on all of the main Hawaiian Islands except for Niʻihau, Molokaʻi, and Kahoʻolawe.

Figure 3: Property damage caused by fallen albizia branches. Photo provided courtesy of BIISC.

There is a great need to fully quantify the monetary cost of potential damages from albizia. The Federal Emergency Management Agency (FEMA) requires that analysis studies be conducted as a requisite to apply for federal monies or FEMA grants. An economic study needs to be conducted to assess and measure the financial impact of albizia in Hawaiʻi. The following sections outline the various sectors that are negatively impacted by albizia. In FY17, HISC funded a project through the University of Hawaiʻi to begin analysis of the economic impacts of albizia to Hawaiʻi, as well as map population distributions on Oʻahu and Kauaʻi using high-resolution imagery.

Infrastructure damage

Often the result of fallen trees or branches, one of the main impacts of albizia is damage to infrastructure. Below is a list of the common types of damage to infrastructure in Hawaiʻi caused by albizia.

Roads/access ways

Albizia readily sprout and grow along roadsides. Due to the rapid growth habit of this species, trees can become hazardous to roads within a few years. Fallen trees and branches can easily block roads making them impassable for emergency response personnel, motorists, and residents. Once fallen trees and/or branches block a road, manual removal is the only method that can be used to clear debris and restore access. As albizia are prolific seed producers, mature trees growing adjacent to roadside right-of-ways (ROW) act as a seed source and allow for perpetual reinfestation. This results in the need for continual and constant maintenance. Large hazard trees may require careful removal by a certified arborist, drastically increasing the cost for removal. HDOT reportedly spent $1 million per mile to remove 1,000 albizia trees on the island of Kaua'i, with the removal of one large tree costing as much as $10,000. At other locations statewide, along an estimated 50 miles of road, the albizia tree population is maturing and reaching high densities where it will pose a significant safety risk to highway users – potentially imposing $50 million in management costs (HDOT 2011).

Transmission/ telephone lines

Albizia readily sprout and grow along line infrastructure right-of-ways. Due to the rapid growth habit of this species, trees often attain a height capable of interfering with power and telephone infrastructure within a period of a few years. Trees growing along right-of-ways pose a serious threat to the lines. Large branches are capable of damaging and downing both transmission and telephone lines. Since albizia are prolific seed producers, mature trees growing adjacent to transmission line right-of-ways act as a seed source and allow for perpetual reinfestation of the right-of-way. The result is the need for continual and constant maintenance.

Figure 4: Albizia trees encroaching on power lines.
Photo provided courtesy of BIISC.

Buildings and property

Albizia often shed branches that can cause damage to any structures or personal property (i.e. vehicles) located beneath them. Due to the large size to which albizia can grow, damage caused by hazard trees can occur from adjacent properties, natural lands, or right of ways.

Stream clogging

In high rain events, fallen trees and branches can block streams at constriction points, resulting in debris accumulation and flooding. In 2004, heavy rains and albizia debris

contributed to the flooding of Mānoa stream. This flood event impacted residents, utilities, and the University of Hawai'i at Mānoa. An estimated $85 million in damage was caused by this single event (Honolulu Advertiser, 2007).

Human Health Hazards

Falling branches and trees pose a serious threat to human health. Due to the extreme height achieved by some albizia, both large and small branches can cause severe injury or death when dropped. Fallen branches can block roads and limit access to emergency services. There have been multiple recorded albizia related fatalities and injuries in Hawai'i. Many of Hawai'i's popular hiking trails lead through albizia infested areas. Hazard trees in proximity to areas of frequent use expose both residents and visitors to risk.

Ecological Impacts

Figure 5: Albizia within native dominated forest on Hawai'i Island.
Photo provided courtesy of ESRI

Native Forests

The process of albizia becoming established in a native forest sets off a series of events that in time will drastically reduce native biodiversity and promote the success of non-native species. The negative effects of albizia are especially pronounced in forests that have already been invaded by non-native species such as strawberry guava (*Psidium cattleianum*). Typically seedlings become established in new areas following a disturbance event such as road construction, a landslide, or a hurricane. Once established, seedlings will rapidly increase in height and quickly overtop the surrounding trees. Having reached the canopy, the growth form will begin to change from a form with single apical dominance to a dense expanding canopy. This large spreading canopy effectively blocks the sunlight and suppresses growth of the trees beneath. Aside from suppressing the growth of other plants, albizia has been shown the change nutrient levels in soils (Hughes, et al. 2006). Albizia are highly effective at fixing nitrogen, a trait that facilitates its rapid growth. This change has a direct impact on native plants, since Hawai'i's volcanic soils are naturally nutrient deficient and the plants that evolved here have adapted to thrive without requiring large amounts of nitrogen. The impacts of greatly increasing the nitrogen inputs from albizia in the form of leaf litter have been shown to profoundly transform invaded forests (Hughes, et al. 2006). This nitrogen "boost" facilitates invasion

by weeds adapted to high nitrogen levels while simultaneously suppressing native plant species. The increase of non-native plant species and decrease of native plant species also reduces the availability of quality habitat for native animals. The cumulative impacts of albizia populations have long-term detrimental consequences for Hawaiian ecosystems.

Water/Hydrology Impacts

There are no formal data regarding evapotranspiration rates or hydrological impacts, though the high growth rate of albizia may indicate substantial water use. In addition, the nitrogen fixing properties of albizia have been shown to provide nutrients to other invasive species such as strawberry guava (*Psidium cattleianum*) (Hughes, et al. 2006). The hydrological impacts of strawberry guava have been researched, and show that stands dominated with this species have a lower ground-water recharge rate and a higher evapotranspiration rate than native forests (Giambelluca, et al. 2008). Surface water impacts caused by albizia populations include clogging, bank destabilization, and stream diversion. Debris and fallen trees can cause blockages and increase the risk of flooding during high rain events. The shallow rooted nature of albizia growing along streams allows for the bank to become undercut, eventually resulting in the toppling of the tree and destabilization of the bank itself.

Figure 6: Albizia trees growing within urban stream corridor on Oʻahu.
Photo provided courtesy of JC Watson

Agriculture

The impacts of albizia on the agricultural industry in Hawaiʻi have been largely unstudied. However, if the growth rates, cost of removal, and invasive nature of this species are taken into consideration, it is possible to get a general understanding of the negative pressures that albizia places on agricultural activities.

Farming

Albizia infestations effect both commercial and subsistence farming. Large trees adjacent to agricultural properties present a hazard for workers and infrastructure, have the potential to shade out crops, and supply a large amount of seeds that can germinate in cultivated areas. The practice of crop rotation and allowing lands to sit fallow is a standard practice followed by many agricultural businesses. Though the act of leaving a section of land to rest is highly beneficial and a key facet to sustainable agriculture, it also presents an

opportunity for albizia seedlings to become established. Depending on the length of time a plot of land is allowed to sit without cultivation, seedlings can outgrow the farmers' ability to simply plow them over. This results in a removal cost for the farmer. In the event that large plots of land are left fallow for many years, albizia trees can achieve a size and density that is cost-prohibitive to bringing the parcel back into cultivation.

Forestry

Timber plantings in Hawai'i rely on the health and growth of commercial hardwood species. Albizia has been planted as a nitrogen source in several Eucalyptus plantings in Hawai'i and is considered beneficial in some situations. However, if plantings are not managed in an effective manner, planted albizia will negatively impact the site by rapidly overtopping and outgrowing the commercial tree species. The presence of large mature albizia trees within a timber planting also increases the cost during harvest. In some cases, albizia tree populations within active timber production sites make the cost of harvest prohibitively high, resulting in abandonment of the project and a substantial loss of investment for the timber producer.

Cultural

The impact of albizia on cultural sites and historic view planes is significant. Many view planes throughout the state have been changed to the point where historic vistas, geological landmarks, and cultural sights are no longer visible or recognizable. This type of impact is difficult to quantify, as the value of these resources are subjective and changes happen gradually over time. In addition to view plane obstruction, large trees contribute to the degradation of unmanaged cultural sites as trees and roots can cause irreparable damage by destroying walls and agricultural terraces.

Figure 2: View plane obstruction at Wailuku River State Park (Rainbow Falls) on Hawai'i Island. Note the lone albizia tree in the photo from the early 1980s on the left.
Photo provided courtesy of BIISC

Impacts: Objectives and Implementation Tasks

I1: Assess population size and footprint of albizia on a statewide scale	**I1.1:** Complete mapping of albizia populations using Pictometry or other high accuracy techniques to create statewide maps

I2: Assess environmental impacts	**I2.2:** Research hydrological impacts
	I.2.2: Create a distribution model to assess the potential habitat suitable for albizia infestation
	I2.4: Perform hazard analysis based on current footprint and distribution model
	I2.5: Perform tree risk assessments of albizia located along trails and areas of use
I3: Protection of priority watershed and wildlife habitat	**I3.1:** Removal or treatment of all albizia trees in priority watershed areas as identified by the Division of Forestry and Wildlife's priority watershed map
	I3.2: Removal or treatment of all albizia from native dominant forests, areas of high ecological value, and forests containing threatened or endangered species
I4: Mitigate hazards to increase water quality and reduce flooding	**I4.1:** Establish stream pilot program to remove albizia along stream corridors
	I4.2: Removal or treatment of all albizia growing within urban stream corridors
	I4.3: Perform tree risk assessments for albizia trees located within stream corridors
I5: Assess the economic impact of albizia	**I5.1:** Perform an economic analysis of the impacts of albizia and associated costs
I6: Establish sustainable secondary and alternative uses for removed materials	**I6.1:** Explore sustainable alternative uses for materials generated by albizia removal projects
I7: Protect valuable public infrastructure from albizia damage	**I7.1:** Develop a comprehensive list of public infrastructure pieces impacted by albizia
	I7.2: Standard roadside surveys and control of seedlings
	I7.3: Standard utility corridor surveys and control of seedlings
	I7.4: Removal of all hazard trees affecting public infrastructure statewide and create buffer zones of treated trees
	I7.5: Assess hazard trees, cost of treatment for albizia near public schools and universities
I8: Protect private infrastructure from albizia damage from trees located on state lands	**I8.1:** Solicit requests from private landowners abutting state lands for potential removal of hazard trees, in order to generate a cost and resource estimate for removal
	I8.2: Once funding has been secured, (see L4.8) remove hazard albizia located near private lands and create buffer zones of treated trees
I9: Maintain cultural sites and historic view planes	**I9.1:** Assess impacts to historic properties, cultural sites, and view planes
	I9.2: Removal or treatment of trees impacting historic properties, cultural sites, and historic view planes

	I9.3: Develop standard practices for removal from historic sites with minimal impact.

Control Methods

Physical Control

Physical removal of hazard trees requires special equipment and knowledge and must be performed by experienced and certified arborists. The removal or disposal of felled materials is also an important aspect to consider when utilizing this method.

Complete Removal
Complete removal requires the highest level of effort when using any of the physical removal methods for large trees. It entails the complete felling of the tree and the complete removal of all felled materials from the site. This method is typically used in urban environments, where there is insufficient space for materials to be left in place to decompose. This method also results in the highest amount of cost per tree, as it often encompasses the total cost of the felling, removal, and disposal. Though this method is expensive and labor intensive for large trees, it is cost-effective for newly sprouted seedlings. The seedlings are shallow rooted and can be easily hand-pulled until they have attained a height of five feet. Seedlings can easily be bagged and removed from a site.

Hard Trimming
In many cases, under the guidance of a certified arborist, hazard trees can be given a "hard trim", whereby limbs and branches that extend towards infrastructure are cut to: 1) eliminate the possibility that they would fall on such infrastructure, and 2) counterbalance the tree so that it is highly likely to fall away from said infrastructure. Following a "hard trim," the tree may be killed with herbicide and allowed to fall apart safely. This "hard trim" approach can be done at a fraction of the cost that it would take to completely cut down a given tree. To further reduce cost, felled materials can be left onsite if the landowner is willing to allow the tree to decompose in situ.

Girdling
This method is fundamentally the same as the ring-barking technique, and entails the complete removal of a band of the inner and outer cambium layers approximately six inches to one foot wide from around the entire circumference of the tree. Common tools used to strip the bark from the tree include hand tools such as a machete, hatchet, or handsaw. Typical results include defoliation within one year followed by tree death. For faster results, herbicides can be used in conjunction with this method, and are applied to the site of bark removal. This method is fairly labor intensive when compared to other chemical treatment options as discussed in the following section. As both girdling and ring-barking methods do not require the use of herbicide, repeat treatments may be necessary. In addition, this method should not be used on hazard trees, as treated trees are left to die in place and pose a risk to surrounding infrastructure.

Ring-Barking

This control method entails the complete removal of the inner and outer cambium layers from around the entire circumference of the tree. Common tools used to strip the bark from the tree include hand tools such as a machete, bark spud or draw blade. First, incisions are made around the base of the target tree at soil level. The bark is then stripped from the soil up the trunk (approx. four to six feet). This technique is fairly low cost and can be used by virtually anyone. Results are highly effective with defoliation occurring between six months to one year, and death of the tree eventually following. (Hughes, et al. 2012). This method should not be used on hazard trees, as treated trees are left to die in place and pose a risk to surrounding infrastructure.

Figure 8: Ring-barked tree in Sāmoa.
Photo provided courtesy of JC Watson

Chemical Treatment

Using chemical control to treat albizia is highly effective and requires very small amounts of herbicide. There are numerous techniques that can be utilized when treating albizia with a chemical application. Choosing the correct method or combination of methods and pairing them with site-specific strategies is key to the success of any albizia control project.

Incision Point Application (IPA)

IPA is an efficient technique for administering a lethal dose of herbicide directly into the vascular system of woody species. This method can be used as a stand-alone treatment or in combination with hard trimming. It should not be used for hazard trees, as treated trees are left in place and shed branches as the tree dies. Canopy defoliation can be expected within two to six weeks and canopy collapse within two years (Hughes, et al. 2017). Trunks may remain standing for up to three years and fallen trees will continue to decompose for decades or longer. Specifications for treatment include the injection of a 0.5 ml dose of undiluted Milestone® herbicide into equidistant

Figure 9: Control using the Incision Point Application control method.
Photo provided courtesy of BIISC

hatchet incisions (Leary, et al. 2011). Complete instruction can be found in Appendix no. 2. Herbicide costs per tree associated with this method can be calculated by multiplying the cost per milliliter by the number of 0.5 ml doses per tree. For example: The current cost of Milestone® /dose is $0.05. A tree that is approximately 24 inches in diameter will require approximately 15 incisions. ($0.05*15=$0.75). The herbicide cost for this tree will be approximately $0.75. It should be noted that the majority of cost associated with treatment will be from labor; both in the form of cost to treat (time it takes to administer treatment per tree) and time to access (time it takes to access the trees). These costs will vary by project site, as each will have differing levels of accessibility and tree densities. See Appendix no. 2 for complete instructions for using this method. This method should not be used on hazard trees, as treated trees are left to die in place and pose a risk to surrounding infrastructure.

Cut-Stump

The cut-stump method is widely used, and is effective on a variety of different species. This method entails felling the target tree and treating the remaining stump with a concentrated dose of herbicide. Typical herbicides used for cut-stump application include Garlon 4®, Garlon 4 Ultra®, or Garlon 3A® (active ingredient: Tryclopyr) at 20%-100% concentration.

Foliar Spray

The Foliar spray method entails applying a liquid herbicide solution directly to the leaves of a target plant species. This control method is not an effective means of controlling albizia once they have surpassed the seedling stage, but can be a highly effective and efficient means of controlling the dense mats of seedlings that result from a mass germination event. The use of foliar application methods on large trees is not considered to be logistically feasible due to the need for helicopters, custom spray equipment, large quantities of herbicides, and non-target impacts. Foliar application is typically applied with the use of hand, backpack, or vehicle-mounted sprayers.

Biological Control

Biological control involves using host-specific living organisms such as insects, fungi, plant pathogens, etc. to suppress a weed infestation. The use of biological control agents is often the only feasible method of permanently reducing infestations when faced with large, long-established invasive species populations. Biological control research is a lengthy process that typically includes exploratory research in the native range of the target species to search for potential agents, host-specificity testing to ensure potential agents do not have significant non-target impacts, and a review and permitting process through the United States Department of Agriculture Animal Plant Health Inspection Service Plant Protection Quarantine (USDA APHIS PPQ) and Hawai‘i Department of Agriculture (HDOA). Final approval for the field release of the control agent may also require public consultation and disclosure pursuant to the National Environmental Policy Act (NEPA) and Hawai‘i Environmental Policy Act (HEPA).

For albizia, biological control agents would ideally target reproductive capacity and/or

attack trees only in early stages of growth. Caution should be taken to avoid introducing a biological control agent that could weaken or kill adult hazard trees, as this could pose additional risks to people and infrastructure. However, defoliation of adult trees by biological control agents can greatly reduce the effect of wind on these trees thereby lowering the risk of sudden limb drop while slowing tree growth.

Through a HISC-funded proposal, the Institute of Pacific Islands Forestry, Pacific-Southwest Research Station, USDA Forest Service began exploration for potential control agents of albizia in 2015. HISC funded additional research in 2016 and 2018 to conduct additional foreign exploration and begin host-specificity testing. To bring populations of albizia down to manageable levels in Hawai‘i, future and continued biological control research is necessary until a suite of successful agents have been released.

Future Technologies

The potential for currently unknown technologies relating to the management of invasive species may prove to be significant. As new technologies are researched and become available, potential use as a means of controlling albizia should be considered. Some examples may include:

- Gene-drive
- Genetically modified control agents
- Unmanned aerial systems

Control Methods: Objectives and Implementation Tasks

M1: Establish new and effective biological controls for albizia	**M1.1:** Continued biocontrol research
	M1.2: Release of albizia-specific biocontrol agents
M2: Establish additional chemical and physical removal techniques or options	**M2.1:** Research additional foliar, systemic, and pre-emergent control options
	M2.2: Research improved physical removal or treatment options
M3: Establish improved technologies for the control of albizia	**M3.1:** Research of future technologies and methods such as genetic techniques, deployment methods, etc.

Planning

Site-Specific Management Plans

While this strategic plan identifies statewide recommendations for advancing detection and control of albizia, each island (or site within an island) will present its own specific suite of challenges and should develop a specific management and control strategy. Through partnerships between Hawai'i Department of Transportation (HDOT), Hawai'i Electric Light Company (HELCO), Hawai'i County, the US Forest Service, and the Big Island Invasive Species Committee (BIISC), Hawai'i Island has become the forerunner with regards to albizia management and control on a landscape scale. With a team dedicated to albizia removal and standardized community workshops, the actions of BIISC can be used as a model for how to begin on-the-ground albizia management actions.

Template for site-specific control plans
To facilitate the creation of site-specific management actions, a plan template has been developed. See Appendix no. 3 for management plan template. Site-specific management plans provide detailed goal-oriented control strategies to address the unique needs and challenges associated with a given management site. In some instances, an environmental assessment or environmental impact statement may be required.

Community Engagement

Community engagement, empowerment, and participation are all critical components of a robust and diverse management strategy. Engagement of local community leaders, information sharing, and collaborative planning are highly effective means of disseminating information into a community. Adaptable island-based or community-specific plans should be developed to allow for maximum community involvement, management, and control. When beginning community engagement projects, pilot communities with a high likelihood of success should be targeted first. By successfully attaining management within a target community, a positive track record can be established, thus making it easier to move forward and engage other more challenging communities.

Figure 10: Albizia growing in vacant lots pose a threat to adjacent properties.
Photo provided courtesy of JC Watson

The BIISC Albizia Control Teams or "Albizia Assassin" program provides a good example of the steps that can be taken to create community control teams. Steps include:

- Hosting an invasive species management organization representative at a community event such as a neighborhood board or association meeting to present about albizia and discuss the potential program.
- Establishing a community liaison or albizia coordinator. This person assists in setting up training workshops and is the point of contact for the management organization and volunteers.
- Holding a training workshop to engage community members and provide training on hazard tree identification, treatment methods, and protective equipment. These workshops are often paired with a community workday.
- Tracking progress. Tracking and reporting both treated trees and untreated hazard trees not only provides a clear measure of program impact and engagement, but also helps management organizations provide support when needed.

Additional information on how to set up a community control team can be found on the BIISC website at: http://www.biisc.org/neighborhood-albizia-control-teams or in Appendix no. 4.

Access

Willing Landowners

Cooperative planning with landowners and obtaining permission for access will be necessary for all survey and control operations. Given the variety of different chemical and physical methods available for albizia management, it is important to accommodate a landowner's preferred management or control technique.

Resistant or Unresponsive Landowners

In the event that a landowner is either resistant or unresponsive, project managers must evaluate whether long-term project success requires treatment of the landowner's property, and whether the benefits of project success outweigh the costs (financial and otherwise) of pursuing legal action to gain entry to the property. There are multiple provisions in state law to gain access to private property for control of albizia, but these should be used as a last resort, only when access is denied and treating the property in question is crucial to protecting public safety and resources at large.

Hawai'i Revised Statutes (HRS) 127A-18 gives the Governor the authority to authorize access to private property to cut, trim, or remove dangerous trees or branches that pose a hazard to other properties. The Governor may also put a lien on the tree owner's property until the cost of removal is reimbursed to the state (127A-18). There are currently no designated funding mechanisms for the State to perform mitigation efforts relating to albizia.

Similar to HRS 127A-18, the Hawai'i County Code chapter 20, article 2 provides an avenue for the public to report complaints relating to unsafe flora and gives the county authority to

access private property to cut, trim, or remove dangerous trees or branches that pose a hazard to other properties. As defined in this ordinance, "Unsafe flora" means any or any part of a tree, bush, vine, or grass that poses an imminent danger for fire, health, safety, property damage, or criminal threat to persons or adjacent property and structures including buildings, roofs, rain gutters, antennae, driveways, landscaping, privacy structures (including gates, fencing, and stone walls), tents, garages, automobiles, power lines, phone lines, playground equipment, water catchment tanks, swimming pools, or any other structures and property (2016 CC, c 20, art 2, sec 20-1).

Recent passage of House Bill 606 (2017) further delegates authority held by the Department of Agriculture to the Counties and their agents, to enter private property to address an invasive species. Once signed into law, implementation will be in the hands of the counties. It will be useful to monitor the progress and different approaches taken in each county to benefit the public through this act.

To assist with making contact and beginning the notification process, sample letters to unresponsive landowners have been developed by BIISC. See Appendix no. 5 for sample letters.

Stakeholder Coordination

Forging positive relationships between state agencies, federal agencies, legislatures, community groups, researchers, industry professionals, and landowners will be crucial to the success of any large-scale management activities required to control albizia on a statewide scale. Potential stakeholders include: utility companies, state agencies, neighborhood boards, private landowners, community associations, watershed partnerships, etc.

Liability

Albizia trees present a unique situation in terms of liability for damage caused by falling trees or branches. Determining liability depends on many factors. Some factors may be based on if the tree is located on private or public lands, whether or not the tree has been identified and reported as a hazard, whether or not the tree has been treated, and whether or not warning signage has been posted. Depending on the circumstances, liability for costs of damage associated with falling trees or tree limbs may be assigned to the owner of the land where the tree resides, the individual who treated the tree, or to the organization/agency responsible for management actions. To reduce liability, it is highly recommended that signage be utilized whenever possible. Signs should comply with Hawai'i Administrative Rules 13-8 (Act 82) and with the American National Standards Institute (ANSI), and be inspected annually. Signs should also be constructed of materials that will not degrade in adverse environmental conditions and should be posted for three years, or until all treated trees have fallen down. To further reduce liability and minimize risk of damage caused by management actions, community engagement and notification should be considered.

Planning: Objectives and Implementation Tasks

P1: Support creation of detailed action plans	**P1.1:** Creation of detailed island specific or site specific management plans and/or hazard mitigation plans for Kauaʻi, Oʻahu, Molokaʻi, Maui, Lanaʻi, and Hawaiʻi
	P1.2: Create albizia-specific biocontrol plan
P2: Empower the community to take action	**P2.1:** Development of island based outreach plans
	P2.2: Create albizia control teams on Kauaʻi, Oʻahu, Maui, and Lanaʻi
	P2.3: Engage neighborhood boards, community associations, etc. in albizia impacted areas
P3: Engage landowners and other stakeholders	**P3.1:** Reach out to all large landowners with albizia populations
	P3.2: Explore treatment and removal options on private lands
	P3.3: Creation of an interagency Albizia Control Working Group

Legislature, Policy, and Funding

The successful control of a previously unmanaged invasive species will require a high degree of support from policy and lawmakers. Having a legislative body that is willing to make long-term commitments will be paramount to the successful management of albizia in Hawaiʻi. Direct engagement and outreach will also be a critical facet when attempting to gain support in the legislature. Legislative actions such as incentives or funding appropriations will have a direct effect during the early stages of statewide albizia management actions, and will serve as a foundation for future management actions. Long-term legislative actions such as improved regulations, a prohibition on planting, real-estate disclosure clauses, etc., will provide a lasting structure to further reduce impacts from albizia to the people of Hawaiʻi. In-kind funding or volunteer efforts will likely play a large role when engaging communities and creating Albizia Control Teams. In addition to supportive statutory policies from the Legislature, there is also a need for the creation of administrative rules and best management practices for agencies, partners, and the general public for managing albizia in an effective manner. The purpose of standardized best management practices is to provide guidance as to when management actions should be taken, the time frame for removal activities, and which method of treatment to use.

Legislature, Policy, and Funding: Objectives and Implementation Tasks

L1: Create policies that support albizia control and management	**L1.1:** Prohibit future planting of albizia (*Falcataria moluccana and Albizia chinensis*)
	L1.2: Officially designate albizia as a HISC priority species/ invasive species
	L1.3: Officially designate Albizia as a noxious weed

L2: Establish best management practices	**L2.2:** Establish standard best management practices for agencies
	L2.3: Establish standard best management practices for government contractors and industry professionals
	L2.4: Establish guidelines for best management practices for the public
	L2.5: Establish road right-of-way seedling control protocols
	L2.6: Establish minimum criteria for long-term maintenance of highway ROW and 150 foot buffers in environmental documents for highway development projects including new construction as well as road widening (e.g. Albizia free for ten years post construction)
L3: Create incentives to assist landowners with Albizia control and to mitigate hazard tree removal	**L3.1:** Tax credit or other incentives for removal of hazard trees on private property
	L3.2: Explore opportunities to establish a cost-sharing or subsidy programs
	L3.3: Real estate disclosures for properties with large albizia and/or hazard albizia on neighboring property
L4: Increase funding for statewide albizia management efforts	**L4.1:** Funding for hazard tree removal pursuant to HRS 127A-18
	L4.2: Funding for Albizia specific biocontrol research
	L4.3: Funding for hazard trees in pilot programs on Kauaʻi, Oʻahu, Maui, and Lanaʻi
	L4.4: Funding for Community based control pilot programs on Kauaʻi, Oʻahu, Maui, and Lanaʻi
	L4.5: Funding for continued early detection efforts on Molokaʻi
	L4.6: Funding for continued albizia control work on Hawaiʻi Island
	L4.7: Identify sources of funding for invasive species work in the highways' ROW
	L4.8 Use estimate identified in I8.1 to request funding from the legislature to remove hazard trees near private property but which are located on state lands

All Objectives and Implementation Tasks

The following strategies, goals, and recommendations aim to provide a road map to successful management of albizia on a landscape scale throughout the State of Hawai‘i.

Impacts	
I1: Assess population size and footprint of albizia on a statewide scale	**I1.1:** Complete mapping of albizia populations using Pictometry or other high accuracy techniques to create statewide maps
I2: Assess environmental impacts	**I2.2:** Research hydrological impacts
	I.2.2 Create a distribution model to assess the potential habitat suitable for albizia infestation
	I2.4: Perform hazard analysis based on current footprint and distribution model
	I2.5: Perform tree risk assessments of albizia located along trails and areas of use
I3: Protection of priority watershed and wildlife habitat	**I3.1:** Removal or treatment of all albizia trees in priority watershed areas as identified by the Division of Forestry and Wildlife's priority watershed map
	I3.2: Removal or treatment of all albizia from native dominant forests, areas of high ecological value, and forests containing threatened or endangered species
I4: Mitigate hazards to increase water quality and reduce flooding	**I4.1:** Establish stream pilot program to remove albizia along stream corridors
	I4.2: Removal or treatment of all albizia growing within urban stream corridors
	I4.3: Perform tree risk assessments for albizia trees located within stream corridors
I5: Assess the economic impact of albizia	**I5.1:** Perform an economic analysis of the impacts of albizia and associated costs
I6: Establish sustainable secondary and alternative uses for removed materials	**I6.1:** Explore sustainable alternative uses for materials generated by albizia removal projects
I7: Protect valuable public infrastructure from albizia damage	**I7.1:** Develop a comprehensive list of public infrastructure pieces impacted by albizia
	I7.2: Standard roadside surveys and control of seedlings
	I7.3: Standard utility corridor surveys and control of seedlings
	I7.4: Removal of all hazard trees affecting public infrastructure statewide and create buffer zones of treated trees
	I7.5: Assess hazard trees, cost of treatment for albizia near public schools and universities

I8: Protect private infrastructure from albizia damage from trees located on state lands	**I8.1:** Solicit requests from private landowners abutting state lands for potential removal of hazard trees, in order to generate a cost and resource estimate for removal
	I8.2: Once funding has been secured, (see L4.8) remove hazard albizia located near private lands and create buffer zones of treated trees
I9: Maintain cultural sites and historic view planes	**I9.1:** Assess impacts to historic properties, cultural sites, and view planes
	I9.2: Removal or treatment of trees impacting historic properties, cultural sites, and historic view planes
	I9.3: Develop standard practices for removal from historic sites with minimal impact.

Control Methods	
M1: Establish new and effective biological controls for albizia	**M1.1:** Continued biocontrol research
	M1.2: Release of albizia-specific biocontrol agents
M2: Establish additional chemical and physical removal techniques or options	**M2.1:** Research additional foliar, systemic, and pre-emergent control options
	M2.2: Research improved physical removal or treatment options
M3: Establish improved technologies for the control of albizia	**M3.1:** Research of future technologies and methods such as genetic techniques, deployment methods, etc.

Planning	
P1: Support creation of detailed action plans	**P1.1:** Creation of detailed island specific or site specific management plans and/or hazard mitigation plans for Kauaʻi, Oʻahu, Molokaʻi, Maui, Lanaʻi, and Hawaiʻi
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Appendices

1. Senate Resolution 41 S.D. 1
2. Control guide for administering incision point application using Milestone® herbicide
3. Template for site-specific or species-specific management plan
4. Big Island Invasive Species Committee – Albizia Control Team Overview
5. Big Island Invasive Species Committee sample Letter to Absentee landowner

THE SENATE
TWENTY-SEVENTH LEGISLATURE, 2013
STATE OF HAWAII

S.R. NO. 41 S.D. 1

SENATE RESOLUTION

URGING THE INVASIVE SPECIES COUNCIL TO DEVELOP AND IMPLEMENT A COMPREHENSIVE INTERAGENCY PLAN FOR THE CONTROL AND ERADICATION OF ALBIZIA THROUGHOUT THE STATE; STARTING WITH THE ISLAND OF HAWAII, AND TO PARTNER TO UTILIZE ALBIZIA TREES THAT ARE REMOVED AND URGING THE DEPARTMENT OF AGRICULTURE TO INVESTIGATE BIOCONTROL AGENTS FOR THE CONTROL OF ALBIZIA.

WHEREAS, the *Falcataria moluccana*, commonly known as the Albizia tree, is native to the South Pacific and was introduced to Hawaii in 1917; and

WHEREAS, Albizia is a fast growing tree with shallow roots, brittle wood, and a weak structure; and

WHEREAS, Albizia's rapid growth rate and soil-altering roots and foliage pose a threat to lowland native forests, falling Albizia trees and branches pose a safety hazard to homeowners and motorists, and Albizia trees have damaged overhead and underground utilities; and

WHEREAS, Albizia has proliferated on the island of Hawaii to the point where it has become a significant problem; and

WHEREAS, the Big Island Invasive Species Committee, a voluntary partnership of private citizens, community organizations, businesses, land owners, and government agencies, has attempted to control and eradicate Albizia but has experienced difficulty doing so because of the extent of Albizia's proliferation on public and private lands and because the Big Island Invasive Species Committee is significantly underfunded at the policy level; and

WHEREAS, policy-level direction, coordination, and planning are needed to properly control and eradicate Albizia on the island of Hawaii; now, therefore,

BE IT RESOLVED by the Senate of the Twenty-seventh Legislature of the State of Hawaii, Regular Session of 2013,

that the Invasive Species Council is urged to develop and implement a comprehensive interagency plan for the control and eradication of Albizia throughout the State, starting with the island of Hawaii, pursuant to chapter 194, Hawaii Revised Statues; and

BE IT FURTHER RESOLVED that the Invasive Species Council is urged to find partners to utilize the Albizia trees that are removed; and

BE IT FURTHER RESOLVED that the Department of Agriculture is urged to investigate biocontrol agents for the control of Albizia; and

BE IT FURTHER RESOLVED that certified copies of this Resolution be transmitted to the Chairperson of the Board of Agriculture and the Invasive Species Council.

Herbicide Labels:

FIFRA Sec. 24(c) Special Local Need Label For Distribution and Use Only in the State of Hawaii For Control of Albizia (*Falcataria moluccana*) and Other Woody Species in Natural Areas. http://www2.hawaii.gov//hdoa/labels/sln/1203_2017.pdf

Milestone® Specialty Herbicide, EPA Reg No. 62719-519 (Dow AgroSciences LLC, Indianapolis, IN). http://www.cdms.net/LDat/ld77N015.pdf

Guides for Herbicide Injection:

Practitioner's Guide for Testing Herbicide Efficacy with the Incision Point Application (IPA) Technique on Invasive Woody Plant Species. http://www.ctahr.hawaii.edu/oc/freepubs/pdf/WC-11.pdf

Practitioner's Guide for Effective Non-Restricted Herbicide Techniques to Control and Suppress Invasive Woody Species in Hawaii. http://www.ctahr.hawaii.edu/oc/freepubs/pdf/WC-10.pdf

Guides for Measuring Tree Height:

http://www.ctahr.hawaii.edu/forestry/links.html
http://www.wikihow.com/Measure-the-Height-of-a-Tree
https://play.google.com/store/apps/details?id=com.taakkumn.iHypsometerLite&hl=en

Local Sources for Herbicide Purchasing:

Hawaii Grower Products Inc.
http://www.hawaiigrowerproducts.com

BEI Hawaii
http://www.beihawaii.com

Crop Production Services Inc.
http://www.cpsagu.com/regions/Hawaii

Key search terms for online purchasing:

Drop Dispenser Bottle, Hatchet, Bush Pilot Hatchet, Survival Hatchet, Camping Hatchet

Contributors:

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Disclaimer:

Mention of specific brand names does not constitute endorsement on the part of the authors, CTAHR, or the University of Hawai'i.

Proper Technique for Injecting Albizia (*Falcataria moluccana* L.) with the herbicide Milestone® (active ingredient: Aminopyralid)

This guide explains how to administer an effective herbicide injection application to medium and large albizia canopy trees occupying natural areas in accordance to FIFRA section 24(c) Special Local Need (SLN) registration HI-120003. It is a violation of Federal law to use this herbicide in a manner inconsistent with its registered application methods. ALWAYS READ THE LABEL FIRST!

Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawai'i at Mānoa

The injection method, also known as Incision Point Application (IPA), is a calibrated, hygienic, and efficient technique for administering suppressive or lethal herbicide doses directly to the exposed vascular systems of woody species. In previous studies, Milestone® (active ingredient aminopyralid; Dow AgroSciences LLC, Indianapolis, IN) injections were proven to be lethal to medium size, 12 in. trunk diameter, albizia trees administered with a ***0.5 ml dose of undiluted herbicide injected into hatchet incisions spaced every 10 in. around the circumference of the trunk, at a height within 3 ft. above ground level. For trunks >24 in. diameter, injections should be spaced every 5 in. For trunks >36 in. diameter injections should be spaced every 2 in. (complete girdle).***

Application Technique:

1. Make an incision with the hatchet at a 45° angle that penetrates just beyond the bark and cambium layers (approximately 2-3 in. deep) so that it creates an intact trough/notch (see figure). You may widen the notch by wiggling the blade.
2. With a dropper bottle, deliver the herbicide dose to the center of the incision so that all of the herbicide is retained within the trough. This is accomplished by slowly and precisely squeezing the bottle to deliver one drop at a time. Be sure that the incision is deep enough to prevent the herbicide from overflowing at the seam. Dropper calibrations have consistently measured 11-12 drops per 0.5 ml, but may vary and should be tested.

Steps to a proper injection: (i) incision using a hatchet on an angle to create a clean, intact trough; (ii) herbicide drops retained and absorbed into the vascular system of the target tree; (iii) large size tree with close injection spacing.

Equipment and Resources:

- Hatchet/machete
- Drop Dispenser Bottles (1-8 fl. oz.)
- Herbicide formulation
- Tape measure
- GPS
- PPE: safety goggles and nitrile gloves

Management Plan:

1. This SLN application is for natural areas only. Milestone® cannot be used in residential areas.
2. Do not exceed the maximum allowable amount of 7 fl. oz. per acre, which is equal to 414 injections (0.5 ml each). Medium size trees are treated with 2-3 ml total, which is enough for up to 200 trees per acre (~50 large trees).
3. Do not treat large trees that may damage infrastructure and block right-of-ways. Estimate impact zone to be greater than the height of the tree (see *guides for measuring tree height*).
4. Dead standing trees are brittle and dangerous to cut: if you plan to cut the trees down, do not use this technique.
5. Consult with a certified arborist for proper removal of large trees.

CAUTION! Dead standing trees are hazardous to property and personal safety!

Expected Results:

Warning! This technique leaves dead trees in place. Complete canopy defoliation can be expected within 4-6 weeks. Canopy collapse can be expected within 2 years and may continue decomposing for a decade or longer. Retreatment of large trees may be necessary if new leaf canopy is observed 12 months after first treatment.

MANAGEMENT/CONTROL PLAN TEMPLATE:

The following outline can be used as a base template for the development of site specific or species-specific management plans. Images and maps should be used to add context and clarity to the plan.

A. Cover Page
- a. Plan title
- b. Name of organization
- c. Name of report writer/s
- d. Date

B. Table of contents

C. Stakeholder Identification
- a. List and identify stakeholders, land managers, or land owners who will need to be involved when conducting management actions. This is also the place to list additional authors, contributors, sponsors, etc.

D. Introduction/Background
- a. Introduction
  - i. Site description, location, reason for the plan
- b. Species profile
  - i. Brief physical description
  - ii. Natural range
  - iii. Include HWPRA score if applicable
- c. Historic Information
  - i. Date of first detection/introduction
  - ii. Geographic area impacted by species
    1. GIS map of sites
  - iii. Past response measures if any
    1. GIS maps of past control efforts
  - iv. Effects/Impacts of species
    1. Effects to:
       - a. Native Plants and animals
       - b. Hydrology/Run-off/nutrient cycling etc.
       - c. Human health
       - d. Economy

E. Management/Control Methods

Go over which methods of control are applicable and will be used at the site. Explain in detail the benefits and drawbacks of each applicable technique, as well as the methodology for application or control. Examples include:

- a. Manual removal
  - i. Explain how species can be manually controlled
- b. Chemical

        i. Explain how species can be chemically controlled
    c. Other
        i. Other control methods (i.e. Biocontrol, sterile male, trap type, etc.)

F. Site specific Management/Control plan (this section can be singular or may include many sites)

- a. Goals and objectives for the site
- b. Applicable control methods
    - i. Explain how to control at site using manual, chemical, and other methods etc.
- c. Timeline for management/control per site
    - i. Best time or season for management/control, when it will begin, and duration of control as covered in this plan
- d. Liability considerations
    - i. Make sure that you diligently consider, list, and define the steps that you will be taking to minimize liability associated with your project.
        1. Signage and notification
        2. Should insurance be considered for your group or for community groups?
- e. Issues/problems
    - i. Explain known or potential hindrances to the overall success of your project (Outreach needed, access, laws, etc.)
        1. Address how to solve issues/ problems

G. Cost

- a. Project budget

H. Community Involvement

- a. Will plan rely on community involvement?
    - i. Identify and discuss level of involvement if any

I. Measures of success

- a. What will you be using to determine if your plan is successful?

J. Conclusion

K. Literature Sighted

- a. If you had any references in your plan, list them here

L. Compliance

- a. Based on your management plan, are compliance documents required for the following?
    - i. Hawai‘i Environmental Protection Act
    - ii. National Environmental Policy Act

To create a multi-species plan:

- Repeat #4-6 for each species
- Include all species control efforts in budget
- Include measures of success for each species

BIISC
BIG ISLAND INVASIVE SPECIES COMMITTEE

Albizia Control at the Community Level: ACT!

The Problem:

Falcataria moluccana was introduced to Hawaii over 100 years ago and has been identified as one of the most problematic invasive species affecting Big Island communities today. Possibly the fastest growing tree in the world, albizia forms weak, brittle wood, matures quickly, and spreads easily through wind-borne seeds. It poses a serious threat to both our natural environment and our public safety.

Albizia is notorious for its tendency to lose large, heavy limbs in even mild winds. Even before Tropical Storm Iselle, during which dozens of people were trapped for hours and several homes crushed, the residents of Puna had long dealt with the hazard of falling albizia. Outbuildings, fences, and cars were among the common casualties of albizia limbs. Albizia is prone to "sudden limb drop," where hidden weaknesses in the limbs can cause branches to fall even with no apparent disturbance.

The costs to taxpayers and utility customers from albizia impacts are high**.** Besides the costs of removing trees that are direct threats, HELCO, HDOT, and the County routinely must deal with the impacts of trees falling from private property onto roads and power lines. HELCO estimates that it spent $13M responding to damage from Iselle, and **t**he Hawaii Island branch of the state DOT estimates that 90% of all received calls about fallen trees are for albizia. Costs to individual property owners from trees falling on to adjoining properties have not been compiled, but are likely in the millions of dollars.

Addressing the Problem: Community Empowerment

While many legislative bills to fund a comprehensive albizia program have been proposed, so far, none have been enacted. Limited funding has been provided from various sources, catalyzed by the allocation of funds from County Council Puna representative Greggor Ilagan. Puna and Hilo residents are stepping up to improve the safety and well being of their communities through control of albizia.

BIISC works with community associations, boards, neighborhood watch groups, or community organizations that want to address albizia. We will work with the group and their designated liaison (an "albizia coordinator") to train volunteers to assess tree safety, treat non-hazard trees, and track and monitor albizia. The group will also receive support materials to use in contacting property owners, private entities, or government agencies for help. BIISC outreach staff will work with community coordinators to address specific issues that arise as volunteers seek action on the hazard trees in their neighborhoods.

BIISC will continue to educate and work on our legislators on the problem, and to seek paths through which community members can find assistance for removing this menace from their neighborhoods.

ACT: Albizia Control Teams

STEP 1: Presentation and Program Overview
The first step is to host a BIISC representative at your next community association, board, or neighborhood watch meeting to discuss the program and determine if this is the right direction for your community.

Once your community has decided to move forward and "ACT", a liaison or "albizia coordinator" should be designated. This is a very important role, as this person will assist in making arrangements for training workshops as well as providing support for community volunteers. Your coordinator will be the point of contact for BIISC and community volunteers, and will also help with tracking of albizia trees.

We suggest that the board or community association use the template enclosed in this packet to determine what responsibilities will fall to the community coordinator(s).

STEP 2: Volunteer Training Workshop
Once the coordinator is in place, he or she will work with BIISC to host a BIISC community volunteer training workshop. Outreach for the workshop is key: BIISC can provide some color flyers and will publicize the event on our website and social media, but we find that the best way to generate a good turnout is through neighbor-to-neighbor encouragement.

On the day of the workshop, volunteers will be presented with the scope of the program and encouraged to "sign up" for *kuleana* of a specific area, block, or section of street. The albizia coordinator can follow up after the workshop with individuals who express interest. A suggested template for a volunteer sign-up sheet is included in this packet.

STEP 3: Volunteer ACTion!
If requested, BIISC will supply the coordinator with maps of the specific areas taken on by ACT volunteers. The coordinator will be provided with templates, helpful information on legislation regarding albizia, and other tools to support the ACT volunteers as needed. BIISC staff will also be available to assist coordinators if unusual or uncertain situations arise, and will provide ongoing support and training as needed.

STEP 4: Tracking
Because BIISC is working hard for legislative action and grant funding, tracking is a really critical part of our efforts. We ask that ACT volunteers and coordinators work together to track both treated trees and hazard trees and report this work to BIISC. A tracking sheet template is included in this packet.

[DATE]

Dear [RECIPIENT],

I am reaching out to you in regards to a property you own on [ADDRESS], TMK No. _____ in [SUBDIVISION] on the Big Island of Hawaii.

I/We are concerned about a specific hazardous tree(s) growing on your property that is posing a threat to (provide specific description of the structure). Pictures of the tree and structure are enclosed.

You may or not be aware of the threat posed by this invasive tree, but *Falcataria moluccana* or albizia is one of the fastest growing trees in the world. The wood is very brittle and branches break off easily, causing severe property damage, loss of electric power, and even car accidents.

Our community is working together to address the threat of this tree and prevent an occurrence of the kind of devastation Hawaii Island faced in the aftermath of Tropical Storm Iselle. Because of the widespread recognition of liability issue of this particular tree, removal is necessary to prevent a significant decrease in property value.

Albizia has been recognized as a serious threat by both our state and County. If a property owner does not resolve the problem, the State of Hawaii, through HRS 127A-18 (commonly known as "Act 76") is authorized to enter private property to remove or mitigate the hazard. The cost is then billed to the property owner.

A list of certified arborists can be found at http://alohaarborist.com/index.php/members/oahu-members/. When calling for quotes, keep in mind that there may be ways to reduce the cost of mitigation, such as having the tree trimmed back away from threatened structures. If the tree must be completely removed to mitigate the threat, it may be possible to leave the removed wood in place on your property to reduce costs. It is important to request that the arborist treat any remaining stumps to prevent regrowth.

Thank you for taking the time to read this letter. Please let us know how you intend to handle this hazard within 30 days of this notice.

I/We greatly appreciate your response,

[SIGNATURE]