Forest Health *highlights*

HAWAII

APRIL 2006

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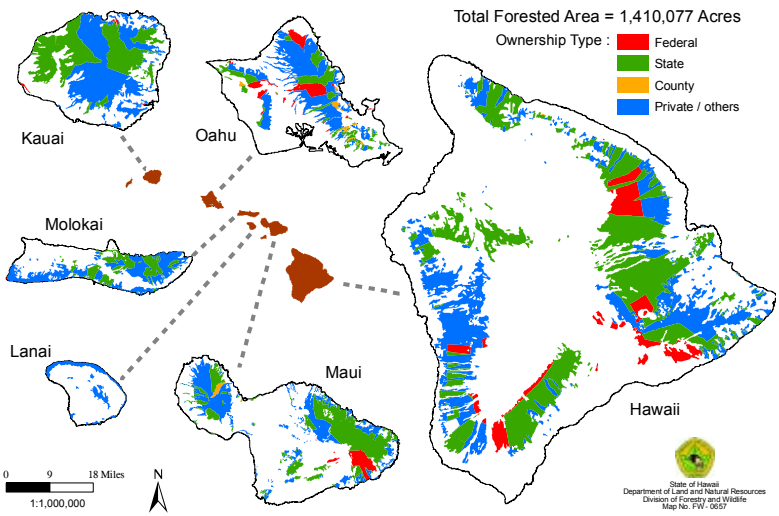
Forest Resource Summary

This report is for the State of Hawaii which includes eight main islands (Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, Hawaii, and Niihau) totaling 4.1 million acres. Public lands occur on all islands except Niihau and Lanai, which are privately owned. Approximately 1.4 million acres of the state are considered forested. Non-forested areas include urban and agricultural areas, recent lava flows, and high elevation sites on Mauna Kea and Mauna Loa on the island of Hawaii and Haleakala on the island of Maui.

The State of Hawaii manages 1,155,900 acres including 643,134 acres in forest reserves and 109,164 acres in the state's Natural Area Reserve System (NARS) making Hawaii's state forest the 11th largest in the nation. The NARS was created to preserve unique native Hawaiian ecosystems and is also managed by the Division of Forestry and Wildlife. Federal lands account for 671,600 acres and are managed by the Department of Defense, National Park Service, and US Fish and Wildlife Service. The National Park Service is the largest federal landowner managing 365,000 acres. There are no lands in Hawaii managed by the US Forest Service.

State of Hawaii : Forested Area by Ownership



The remaining land – 2,272,000 acres – is privately owned. Increasing amounts of private forestlands in mountainous areas are being managed for watershed conservation in concert with publicly owned lands under established partnerships. These watershed partnerships manage upland areas comprising a patchwork of federal, state, and private parcels. They currently manage a combined total of 850,000 acres throughout the state.

Forest Health Monitoring in Hawaii

Monitoring of forest health conditions occurs throughout the state on private, state, and federal lands. The monitoring objectives include the spread and impact of invasive plants, invertebrate pests, diseases, biological control, and ungulates. These programs use ground surveys, transect monitoring, helicopter surveys, road surveys, photo points, and remote sensing for gathering data.

Monitoring forest health in Hawaii presents many challenges associated with its climate and geology. Hawaii's extremely rugged terrain limits ground access to many areas and increases the difficulty of remote monitoring due to vertical slopes and shadow effects. Watersheds can have as much as half of total land area in near-vertical slopes. The exceptionally rugged terrain creates extreme temperature and rainfall gradients that result in diverse ecosystems in close proximity. These transitions occur over a very small scale making monitoring data collected over extensive areas very difficult to interpret. Identifying species as well as classifying them as diseased or infested is a complex and difficult task. Additionally, a thick layer of clouds present much of the year often limits or prohibits remote sensing and aerial surveys of mountainous areas where much of Hawaii's forests are located.

Hawaii's island-level Invasive Species Committees (ISCs) became active in the 1990s with the goal of being able to respond to threats of alien pest infestations and to control established pest populations on a species by species basis. The Maui Invasive Species Committee (MISC), the Molokai subcommittee of MISC (MoMISC), the Big Island Invasive Species Committee (BIISC), the Kauai Invasive Species Committee (KISC), and the Oahu Invasive Species Committee (OISC) are already well involved in the battle against invasive species. Each ISC is a voluntary partnership of county, state, and federal agencies, private businesses, nonprofit organizations, and individuals united in cooperative efforts to control the alien pest species that pose the greatest threats to each island's ecosystems, watersheds, economy, public health, and quality of life.

The ISCs work to prevent incipient species from becoming established in Hawaii's watersheds and natural areas. While the ISCs' geographic scope is island-wide, much of their work is focused in the lower elevation areas, at or near the boundaries of the Watershed Partnerships, on residential or rural properties, or on disturbed forest lands. When the ISCs work in forested mountain areas, they often collaborate with the Watershed Partnerships. ISCs may also work on targeted agricultural pests. ISCs typically do not work on controlling species such as pigs or goats which are both widespread and not good candidates for species based management.

Early Detection

Early detection of newly naturalizing and potentially invasive plant species has been a focus of the Invasive Species Committees and a recognized gap in the current operations of state agencies. Several limited-term research projects have been completed that focused on identifying the locations and extent of populations of plants known to have been planted in Hawaii that have been identified by a Weed Risk Assessment process to pose a threat to native ecosystems. While these surveys covered specific areas once specifically for vascular plants, creating a framework of agencies and data management will ensure that these surveys become incorporated as regular monitoring that is tied to an effective rapid response capability.

Hawaii is unique in our extreme isolation from other terrestrial biodiversity centers. Even once an invasive species becomes established in the state, individual islands may remain free of pest species through intra-state quarantine practices and constant monitoring followed by effective control. Island-wide eradication is the most cost-effective, long-term protection for native ecosystems. While several of the highest priority plant species are fairly widespread compared to current eradication strategy reviews, new targets will be prioritized by the level of the threat they pose to native ecosystems and the feasibility of eradication.

Priority Target Species

All of the species targeted by the ISCs are able to outcompete or drastically alter existing communities, resulting in a change in ecosystem components, structure and function. Some plants, like fountain grass and bushy beardgrass, also change the fire regime of an area. Animal species like coqui consume large amounts of insects, and veiled chameleons are able to take birds, disrupting pollination services and further jeopardizing threatened and endangered species. Some species also impact ecosystems and human health and quality of life, such as long-thorn kiawe, little fire ants and coqui frogs. The following is a description of several ISC target species, but it is not a comprehensive list of ISC targets.

Data

The Invasive Species Committees use a variety of mapping and data management tools including Arc-GIS and Access. A statewide database is being created by the Hawaii Natural Heritage Program to house all ISC data and allow for island or statewide reports to be easily generated. The following is a listing of the shapefile and database elements currently collected.

The GIS shapefiles include the following data elements:

- Action ID
- Feature ID
- Feature Definition
- Method Code

The Summary Report include the following data elements:

- Action ID
- Feature ID
- Action Date
- Geographic Unit
- Taxon Code
- Action Type
- Action Method
- Area Inventoried
- Area Controlled
- Mature Individuals Controlled
- Immature Individuals Controlled
- ISC Staff Hours
- Volunteer Hours
- Contributed Hours
- Reporting Group

The Treatment Report include the following data elements:

- Action ID
- Action Date
- Geographic Unit
- Taxon Code
- Individuals Chemically Treated
- Individuals Manually Treated
- Chemical
- Amount Applied
- Reporting Group

The following is a description of several high profile Invasive Species Committees target species, it is not a comprehensive list of ISC targets. For more information visit: http://www.hear.org/

Fountain Grass (*Pennisetum setaceum*)

- Bunch grass native to Africa, introduced as an ornamental.
- Produces many seeds per year, wind dispersed.
- Seeds remain viable for 7 or more years.
- Promotes and fuels wildfires.
- Potential range is all dry and mesic forests.
- Priority Target for KISC, MISC, OISC.

Pampas Grass (*Cortaderia selloana* and *C. jubata*)

- Large bunch grass native to South America, introduced as an ornamental.
- Produces many seeds per year, wind dispersed. Promotes and fuels wildfires.
- Potential range is all mesic and wet forests.
- Priority Target for KISC, MISC, MoMISC, OISC.

Long-Thorn Kiawe (*Prosopis juliflora*)

- Tree or sprawling shrub native to Africa, introduced for agriculture, possibly accidentally.
- Produces many seeds that are water and animal dispersed.
- Potential range is unknown; appears able to hybridize with short-thorn kiawe.
- Priority Target for KISC.

Bushy Beardgrass (*Schizachyrium condensatum*)

- Tufted grass native to Central and South America.
- Introduction history unknown.
- Produces many seeds, spread by wind and humans. Promotes and fuels wildfires.
- Priority Target for OISC.

Rubber Vine (*Cryptostegia grandiflora*)

- Climbing woody shrub native to Madagascar, introduced and still sold as an ornamental.
- Produces many seeds that are spread by wind.
- Moist forests at risk.
- Priority Target for MISC.
- Large infestation of *C. madagascariensis* on Molokai cannot be controlled by MoMISC with current resources.

Ivy Gourd (*Coccinia grandis*)

- Vine native to tropical Asia, introduced as a food crop.
- Produces many seeds that are bird dispersed; spreads vegetatively.
- Potential range is unknown.
- Priority Target for KISC, MISC.

Cattail (*Typha latifolia*)

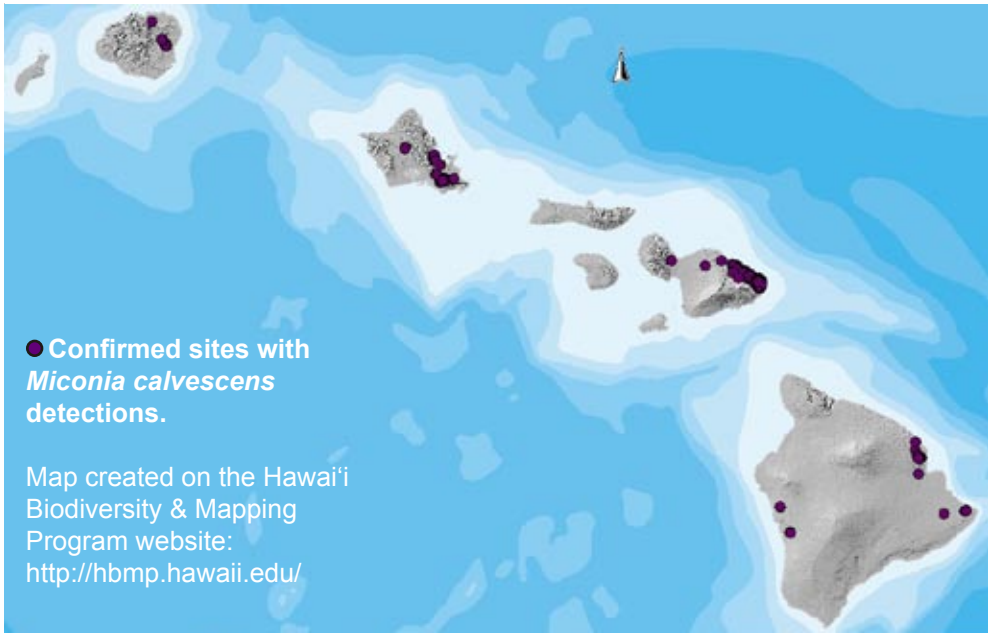
- Wetland rush native to North America, North Africa and Eurasia, introduction history unknown.
- Reproduces and spreads vegetatively and by wind-dispersed seeds.
- Potential range is all low elevation wetlands.
- Priority Target for KISC.

Australian Tree Fern (*Cyathea cooperi*)

- Large tree fern up to 40 feet, native to Australia.
- Introduced and still sold as an ornamental.
- Produces many lightweight spores that are spread long distance by wind.
- Priority Target for MoMISC.

Miconia (*Miconia calvescens*)

Miconia is the highest priority statewide for invasive weed control and was originally introduced to Hawaii as an ornamental plant. It has since established at varying levels on Hawaii, Maui, Oahu, and Kauai (listed in order of most severe to least). Early detection aerial surveys have yet to detect miconia on Molokai, but introduction there is a serious concern. Because the level of infestation differs on each island, management goals and strategies vary among ISCs. Each ISC uses helicopter surveys combined with ground surveys to locate trees, saplings and seedlings. Helicopter surveys are essential in Hawaii because of the extremely rugged terrain, and they have proved very effective at detecting mature miconia trees. Ground surveys conducted by invasive species technicians and volunteers locate and eliminate miconia plants in accessible areas.



Confirmed sites with *Miconia calvescens* detections.

Map created on the Hawai'i Biodiversity & Mapping Program website: http://hbmp.hawaii.edu/

2005 Miconia Survey and Monitoring:	
Island	Acres
Hawaii	11,874
Maui	35,007
Oahu	1,990
Kauai	108
Molokai	9,000
Total	**57,632**

- Miconia is native to Central and South America, introduced as an ornamental.
- Produces millions of seeds per year dispersed by birds, rats, pigs and humans. Seeds remain viable for 10 or more years.
- Potential range is all wet and mesic forests to 6000 ft. elevation.
- Priority Target for BIISC, KISC, MISC, OISC

Site-led Management

In contrast to the ISCs' "species-led" management, many entities in the state carry out "site-led" management of established invasive species. Examples include Hawaii's Watershed Partnerships, the National Park Service, The Nature Conservancy of Hawaii, the Department of Defense, and the Natural Area Reserve System. Target species include established ungulates and invasive plants such as strawberry guava, clidemia, Kahili ginger, and tibouchina. Targets are monitored and controlled using manual, chemical, and sometimes biological control.

Many of these established invasive plants will only be managed effectively in the long-term with the use of biological control. USDA Forest Service and Hawaii Department of Agriculture carry out biological control research essential to weed management in the state. A new biological control agent for strawberry guava that will be released soon by Forest Service researchers on the island of Hawaii offers hope for reducing the impact of this destructive weed, as well as reducing the amount of resources necessary for controlling it with herbicides in protected areas. Release sites will be monitored by Forest Service personnel for several years to determine the level of control achieved by the introduction.

Ohia Rust

Puccinia psidii

A new rust disease on ohia (*Meterosideros polymorpha*) seedlings was detected in a nursery on Oahu in April 2005. The same disease was later found on rose apple (*Syzygium jambos*) growing in forests on Oahu. The disease was eventually identified through DNA analysis as *Puccinia psidii*, commonly known as "guava rust" in Florida and as "eucalyptus rust" in Brazil. The disease is referred to locally as "ohia rust" because of the importance of this native tree, but it infects many species in the Myrtaceae that are present in Hawaii in addition to ohia.

Confirmed host species of *Puccinia psidii* in Hawaii.	
Scientific Name	**Common Name**
Meterosideros polymorpha (H)	Ohia
Syzygium jambos	Rose apple
Eugenia koolauensis (H)	Nioi
Syzygium cumini	Java plum
Eugenia reinwardtiana (H)	Nioi/Beach cherry
Eugenia uniflora	Surinam cherry
Psidium guajava	Common guava
Melaleuca quinqeunervia	Paper bark
Myrtus communis	True myrtle
Syzygium paniculatum	Australian brush cherry
*Syzygium malaccense**	Mountain apple
*Eucalyptus grandis**	Rose gum
*Eucalyptus microcrys**	Tallow-wood

(H) Native to Hawaii
* Artificially inoculated in laboratory

Puccinia psidii on ohia. Photo by Desmond Ogata

The Hawaii Department of Agriculture and DOFAW carried out preliminary surveys in nurseries, landscaped areas, and forests on all islands, but a systematic survey has not been conducted. So far disease presence has been confirmed on all major islands and at elevations as high as 4000 feet. The disease is likely to have spread between islands by wind and the movement of ornamental plants. The disease has been reported on ten different species, three of which are native to Hawaii including one endangered species. An additional three species have been artificially inoculated using inoculum isolated from rose apple.

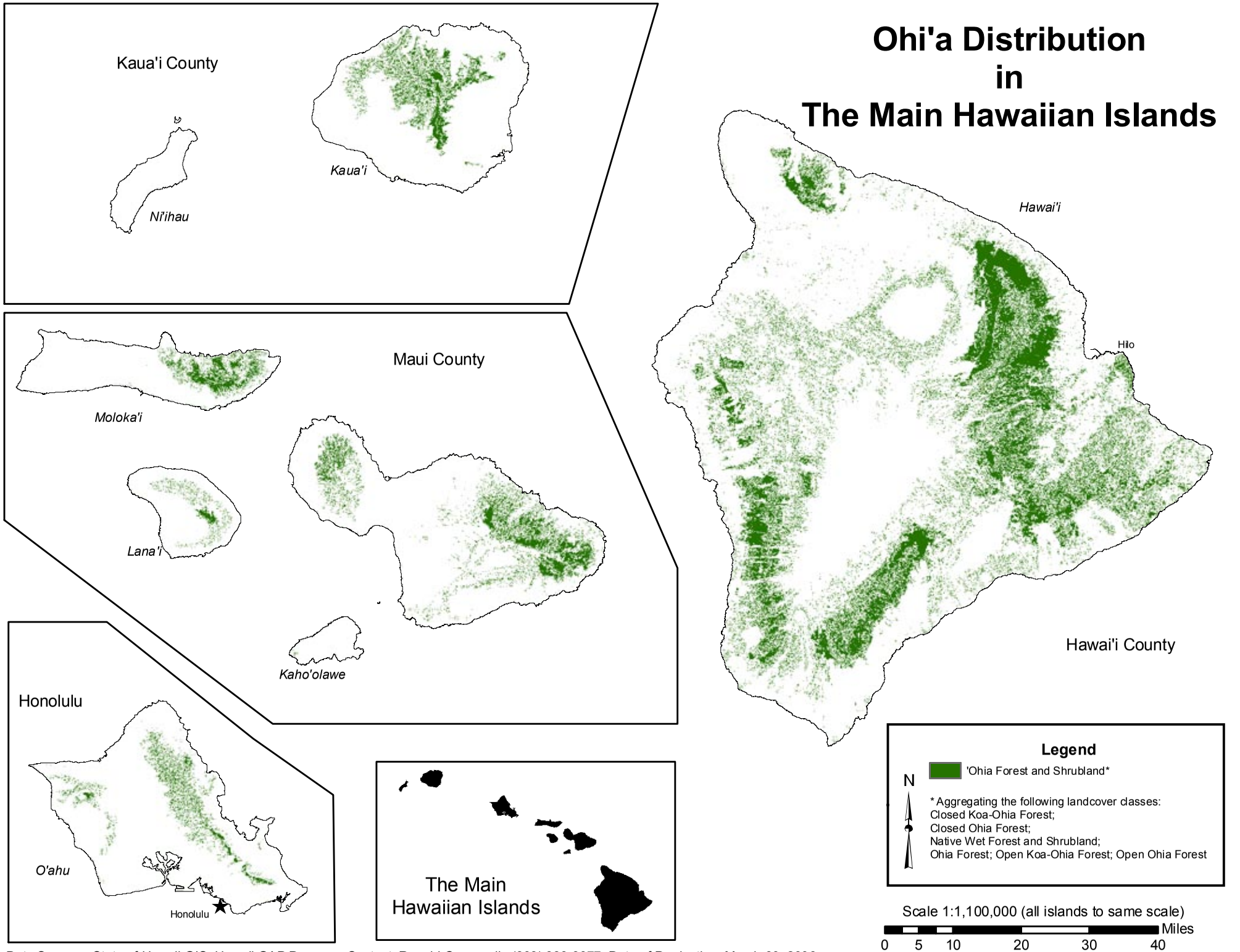
The disease infects young leaf tissue producing copious amounts of spores and causes stunting and shoot dieback on the plant. In some species it also infects reproductive material. The rust rarely kills its host however. Bright yellow-orange pustules develop on plant tissue until the tissue dies. Susceptibility of hosts varies widely among species. In Hawaii the non-native rose apple displays the most dramatic symptoms with observations of all new shoots within in a stand being killed by the disease. Infections on ohia have been reported mostly in nurseries where either environmental conditions or abundance of young, susceptible foliage appears to be conducive to outbreaks of the rust. Some ohia varieties do not develop symptoms when growing in infested nurseries. Detections of the disease in native forests have been at very low levels, and it does not appear to be strongly impacting ohia forests at this point.

Puccinia psidii on ohia. Photo by Desmond Ogata

The disease is a serious concern for Hawaii's native forest. Ohia is the dominant tree species in much of Hawaii's remaining native forests and provides important habitat for endangered birds. Adaptation and increased virulence on ohia is considered a likely development. Commercial eucalyptus plantations could also be threatened, especially as plantations are harvested and replanted. *Eucalyptus* seedlings of commercial species such as *E. grandis* are very susceptible to damage from *P. psidii* in Brazil, although susceptibility in laboratories in Hawaii to local inoculum was found to be minimal on *E. grandis*.

Preliminary DNA analysis by University of Hawaii researchers suggests that the disease strain in Hawaii could differ from strains in Florida and Brazil. Different strains have different host-ranges and can vary in virulence. Further genetic work will clarify differences between Hawaii's disease and that occurring elsewhere. A statewide survey to document the extent of the disease and to describe the environmental conditions where it is found, as well as to further document its host-range has been funded. Restrictions on imports into Hawaii of plant material of all species in the family Myrtaceae from infected regions are being pursued in order to prevent or slow disease adaptations that would increase its virulence.

Ohi'a Distribution in The Main Hawaiian Islands



Data Sources; State of Hawaii GIS, Hawaii GAP Program. Contact: Ronald Cannarella (808) 383-3077. Date of Production: March 30, 2006

Koa Wilt

Fusarium oxysporum f.sp. koae

Koa wilt disease was first described in 1980 on the island of Hawaii and was attributed to the pathogen *Fusarium oxysporum* f.sp. koae. The pathogen infects trees through their roots and causes damage to the vascular system, sometimes leading to crown dieback and tree death. It is not known where the disease originated or how the disease spreads in the environment. Other areas of koa dieback were reported throughout the state thereafter, but little work had been carried out on the disease until the last few years despite the ecological, cultural, and economic importance of koa to the state of Hawaii.

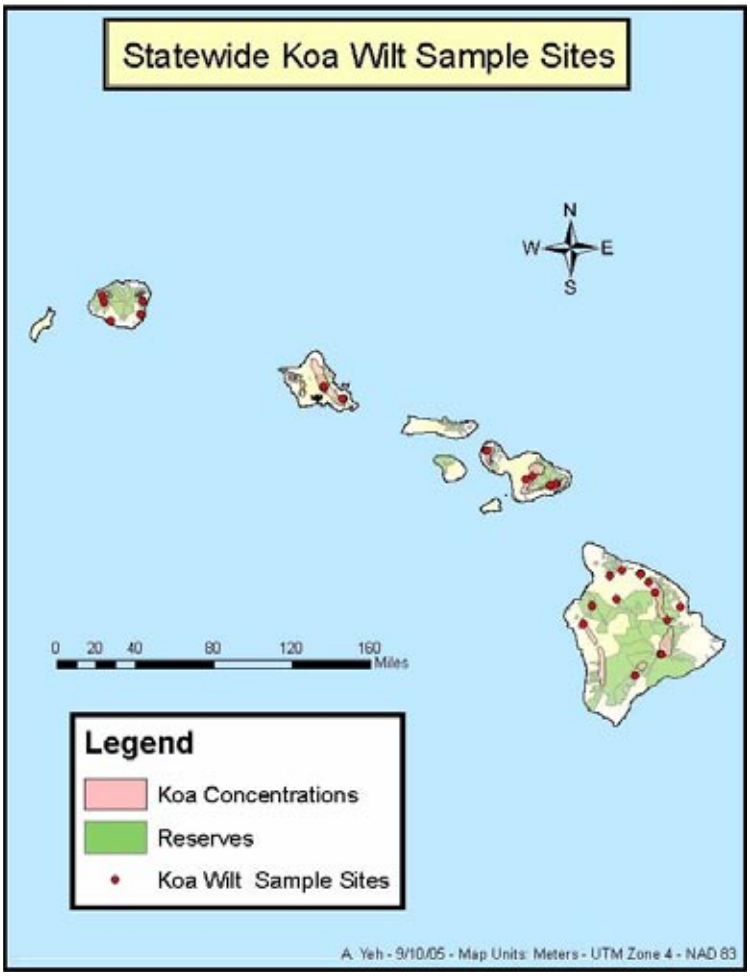
Dying koa trees in upper elevation (5,000-6,000 ft.) forests of Hawai'i Volcanoes National Park. Photo by Donald E. Gardner, University of Hawai`i at Manoa.

Although wide scale dieback has not been observed in forests, there has been a high incidence of the disease causing high mortality rates in koa plantations, especially on former agricultural lands. A survey for koa wilt was conducted in 2004-2005 by the Hawaii Agriculture Research Center and DOFAW with funding from USDA Forest Service Forest Health Protection. The survey located areas with symptomatic trees and collected root, stem, leaf, and seed samples for isolating *F. oxysporum* in the laboratory. Diseased trees were sampled in both plantations and natural forests throughout the state.

Dead or dying trees testing positive for *F. oxysporum* were found on all of the major islands where koa commonly grows. Trees in both planted and natural forests were found infected with koa wilt disease. *F. oxysporum* was found most commonly on roots and soil near diseased trees. Interestingly other *Fusarium* species were also isolated from sampled tissue, and pathologists are exploring the role of these other species in the disease etiology. Methods of sampling for the disease were refined in this survey facilitating future survey and monitoring for the disease. Outreach materials on koa wilt were developed by the University of Hawaii and can be found at:

http://www.ctahr.hawaii.edu/forestry/index.asp.

Many questions remain unanswered regarding koa wilt. The extent of the disease in natural forests is not known, nor is whether the pathogen exists in healthy forests. Knowing how the disease spreads in the environment is also crucial for management. What appears to be genetic resistance has been observed in koa plantations trials, and efforts to develop genetic resistance for plantations are being pursued. Future monitoring will establish forest plots in healthy and diseased stands throughout the state to track the disease over time. Nursery surveys will be conducted to determine whether outplantings could be spreading the disease to forestlands. Other disease causing agents on koa are being isolated and tested for pathogenicity to determine whether they might also play a role in koa dieback.



Erythrina Gall Wasp

Quadrastichus erythrinae

The Erythrina gall wasp (*Quadristichus erythrinae* Kim) was the most damaging arthropod pest in Hawaii's dry forests in 2005. It was first detected in April of 2005, as galls on leaves and stems on ornamental Indian coral trees (*Erythrina variegata*) at the University of Hawaii campus on Oahu. Emergent adult wasps were then positively identified as *Quadristichus erythrinae* Kim, a species only recently described (2004) from specimens from Singapore, Mauritius and Reunion. The current distribution of the Erythrina gall wasp also includes Taiwan, mainland China, India, and most recently, in January of 2006, American Samoa and Guam. Adult wasps show a preference for ovipositing in young tissue and galls have been observed on leaves, petioles, young shoots, stems, flowers and seed pods. Generation time is rapid: the life cycle of the wasp (egg to adult) has been observed as short as 21 days in Hawaii; the adult's life span varies from 3-10 days.

Male and female *Quadrastichus erythrinae*

Once introduced, the tiny wasps were easily dispersed by wind and the movement of people and goods and spread rapidly to neighboring islands. By August of 2005, heavy infestations were reported on coral trees on Oahu and Maui. Further surveys have confirmed its presence on the endemic wiliwili tree, *Erythrina sandwicensis*, on Oahu, Maui, Kauai, Hawaii and Molokai. Gall wasp infestations are confirmed throughout the island of Oahu, in the Kahului and Kehei areas of Maui, in and around Lihue on Kauai, in and around Hilo and the south Kohala and North Kona districts of Hawaii, on Molokai and Kahoolawe. Wiliwili is the dominant tree species in most of Hawaii's dry forests. Although still considered common, little regeneration of wiliwili is occurring due to widespread seed predation by the bruchid, Specularis impressithorax, competition from introduced grasses, and severe browsing pressure by introduced ungulates, in addition to the recent outbreak of Erythrina gall wasp.

Galls on wiliwili

Ornamental trees are generally being treated with a soil drench of imidacloprid. Trials are underway on Hawaii, Oahu and Kauai to test the efficacy of various systemic insecticides, including imidacloprid and abamectin, for protection of Erythrina trees in dry forests. A bioassay and rating of insect damage levels and quantification of insecticide levels throughout wiliwili trees are included. Further treatment depends upon the results of the ongoing efficacy trials. Ongoing management activities by various agencies and organizations also include monitoring the spread and severity of the infestation, banking of wiliwili seeds in the event of widespread mortality, and exploration for biological control agents of the wasp.

Galls with wasp exit holes.

Black Twig Borer

Xylosandrus compactus

The black twig borer was first detected in Hawaii in 1931 and has an extremely wide host range. In Hawaii at least 108 tree and shrub species belonging to 44 plant families are attacked by the black twig borer. Several federally listed threatened and endangered species are impacted by black twig borer damage and its associated fungus *Fusarium solani* including *Flueggea neowawraea*, *Alectryon macroccoccus*, *Melicope saint-johnii*, *Gardenia mannii*, and *Caesalpinia kavaiensis*. The borer also commonly attacks koa, and koa seedlings can suffer high mortality rates in nurseries and outplantings due to the physical disruption of seedlings' vascular system caused by bore holes.

Black twig borer damage is usually worse during drought years but affects plants during wet years as well. The borer is ubiquitous in forested areas under 2500 feet elevation and host species are abundant in all forest types. Monitoring therefore is not a high priority, except for damage on rare and endangered species, which continues to be a problem.

Recent experiments by scientists at the University of Hawaii, Hawaii Agriculture Research Station, and USDA Forest Service PSW Research Station have successfully identified chemicals attractants and repellants for the black twig borer. Studies are planned to monitor impacts of traps with attractants and repellants on borer damage to koa seedlings in plantations and endangered species in natural forest. If the repellants and attractants are effective in reducing borer damage they will become an important tool in managing this pest.

Adult female black twig borer.
Photo by Lyle J. Buss, University of Florida

Grasshopper

Schistocerca nitens

An outbreak of grasshoppers occurred in 2004 on the island of Nihoa. Nihoa is a small island (0.3 square miles) located in the Northwest Hawaiian Islands and is part of the Hawaiian Islands National Wildlife Refuge. *S. nitens* was first documented on Nihoa in the early 1980's. There was an outbreak in 2002 that almost totally denuded the island as happened again in 2004. Scientists speculate that wet weather following a decade of drought conditions produced conditions for an outbreak. *S. nitens* is present on the main Hawaiian islands but outbreaks have not occurred. It is not known what factors on the main islands limit outbreaks. On Nihoa the grasshoppers attack all vegetation including the endemic palm (*Pritchardia remota*) and only tree species.

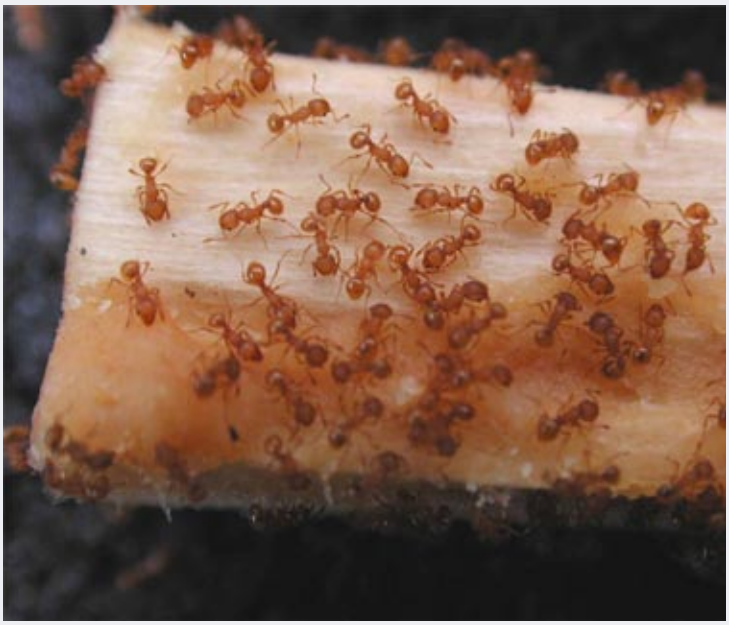
An August 2005 survey of Nihoa by the US Fish and Wildlife Service found grasshoppers at very low densities. The vegetation appeared to be recovering and healthy populations of most of the endangered plant species were found.

Adult *Schistocerca nitens*

Little Fire Ant

Wasmannia auropunctata

- Small, slow moving red ant native to Central and South America, accidental introduction via infested plants.
- Spreads in infected nursery materials, particularly palms.
- Priority Target BIISC, KISC.



Feral Ungulates

Feral ungulates are extremely damaging to Hawaii's forest ecosystems. Pigs, cattle, deer, goats, and sheep all damage forests throughout the state by eating and trampling vegetation and causing erosion. They also contribute to the spread of invasive plants by dispersing seeds of aggressive weeds such as guava and by disturbing the forest floor and soil allowing some of the worst invasives such as clidemia to establish. Pigs are widespread on all major islands, but presence of the other animals varies from island to island. While public hunting suppresses animal populations in some areas, many of the more remote areas where native forests are located do not benefit from public hunting. Management activities focus on fencing to keep ungulates out of priority areas and reducing animal populations using public and staff hunters, traps, aerial shooting, and occasionally snares.

Feral pig in Hawaii Volcanoes National Park. Photo by Jack Jeffrey

Monitoring ungulate populations in Hawaii is very difficult, and no accurate population estimates currently exist for any of the taxa mentioned above. Wildlife managers sometimes survey hunting areas to assess population levels before hunting seasons begin, and hunters are required to report kills at designated hunting stations. In 2005, about 4500 feral animals were killed by public and staff hunters on state lands including 1618 pigs and 1591 goats. Pig monitoring in conservation areas typically involves recording signs of animal presence along five meter wide transects. This type of monitoring occurs throughout the state primarily in native forests. These data can be used to direct hunting efforts or to strategically locate fences. Feral cattle in forest reserves on the island of Hawaii are monitored from helicopter. Cattle detected from the air are recorded with GPS and later hunted. Similarly pig damage and pigs are monitored during helicopter surveys in the Alakai Wilderness Area on Kauai.

Veiled Chameleon

Chamaeleo calyptratus

- Large chameleon, up to 24 inches.
- Native to Yemen, illegal introduction for the pet trade.
- Spread intentionally by humans.
- Priority Target for MISC.

Coqui Frog

Eleutherodactylus coqui

- Native to Puerto Rico, accidental introduction via infested plants.
- Spreads in infected nursery materials.
- Priority Target for BIISC, KISC, MISC, OISC, although resources to control this pest have not kept pace with its spread.

Data Sources

The data sources used for this report include data gathered by Hawaii's island-based Invasive Species Committees or ISCs (funded in part by Forest Service FHP Prevention and Suppression Program), Division of Forestry and Wildlife staff, Hawaii Department of Agriculture, University of Hawaii, and partner organizations such as the Hawaii Agriculture Research Center. Survey and monitoring data collected by the ISCs are entered into a statewide database created by the Hawaii Natural Heritage Program, and the data are analyzed at the local and state levels.

Hawaii's Watershed Partnerships, the National Park Service, The Nature Conservancy of Hawaii, and DOFAW's Natural Area Partnership System also conduct monitoring of invasive plants and ungulates to improve the effectiveness of their management activities, but those data are not the focus of this report. The USDA Forest Service's Forest Health Aerial Survey Program and Forest Inventory and Analysis Program are not currently active in Hawaii.

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