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October 24, 2011

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

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Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Finding of No Significant Impact (FONSI) for "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands"

The Hawaii Department of Agriculture has reviewed the draft EA. The draft EA was published in the Environmental Notice on June 23, 2010. A 30-day public comment period began on June 23, 2010. Comments were received on the draft EA and responses were prepared for each comment. The agency has determined that this project will not have significant environmental effects and has issued a FONSI.

We have enclosed a completed OEQC Publication Form and four copies of the final EA. Please call Dr. Neil Reimer at 973-9522, should you have any questions.

Sincerely,

Russell S. Kokubun
Chairperson, Board of Agriculture

Encs.



OEQC Publication Form The Environmental Notice

Name of Project: Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Applicable Law: Chapter 343, HRS
Type of Document: Final EA
Island: Statewide
District: n/a
TMK: n/a
Permits Required: US Dept. of Agriculture, Animal and Plant Health Inspection Service (APHIS): Plant Protection and Quarantine permits (obtained); Hawai'i Dept. of Agriculture: Permit for Import and Liberation of Restricted Organisms (obtained); Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife: Permit for Release and Monitoring on State Forest Land.

**Name of Proposing/
Approving Agency:** State of Hawai'i
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PROJECT SUMMARY: The Hawai'i Department of Agriculture proposes the environmental release on State lands of a scale insect from Brazil, *Tectococcus ovatus*, for biological control of strawberry guava, *Psidium cattleianum*. *T. ovatus* is a highly specific natural control agent producing leaf galls on strawberry guava that reduce its vigor and fruiting in its native range in Brazil. Strawberry guava exists in balance with other native plants in its native range in Brazil, where it is host to various natural predators and biological control agents. Strawberry guava has no such controls in Hawai'i, and their absence contributes to this fast-growing tree's ability to outcompete the native plant species of Hawai'i, which have both native and introduced predators. The invasion of strawberry guava into native forests has had devastating effects on the biodiversity, cultural resources, scenic beauty, and watershed values of the native forest. Strawberry guava infestations are also a significant source of agricultural pest fruit flies. Introducing a natural biological control agent will help reduce growth and reproduction of strawberry guava, and thus help "level the playing field," allowing Hawai'i's native plants to better compete with the invasive strawberry guava. Initial release of the biocontrol agent is proposed in the vicinity of Volcano and the Ola'a Forest Reserve on the island of Hawai'i, followed by other releases and natural spread. Careful testing of the agent indicates that *T. ovatus* is highly host specific and will not affect other species. *T. ovatus* does not kill strawberry guava or taint its fruit. People will still be able to pick fruit and gather the wood. Hunting will not be adversely impacted and may actually benefit, along with hiking, birding and other activities that depend on forest access, from fewer and less dense thickets.

FINAL ENVIRONMENTAL ASSESSMENT

**Biocontrol of Strawberry Guava by its Natural Control Agent for
Preservation of Native Forests in the Hawaiian Islands**

State of Hawai'i

November 2011

Prepared for:

State of Hawai'i
Department of Agriculture
1428 South King Street
Honolulu, Hawai'i 96814

and

State of Hawai'i
Department of Land and Natural Resources
1151 Punchbowl Street, Room 131
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FINAL ENVIRONMENTAL ASSESSMENT

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PROPOSING/APPROVING AGENCY:

State of Hawai'i
Department of Agriculture
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CLASS OF ACTION:

Use of State Lands and State Funds

This document is prepared pursuant to:
The Hawai'i Environmental Policy Act,
Chapter 343, Hawai'i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai'i Department of Health Administrative Rules (HAR).

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Various places in this Final EA have been modified to reflect input received in comments to the Draft EA; additional or modified non-procedural text is denoted by double underlines, as in this paragraph.

SUMMARY OF THE PROPOSED ACTION, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The Hawai‘i Department of Agriculture proposes the environmental release on State lands in Hawai‘i of a scale insect from Brazil, *Tectococcus ovatus*, for biological control of strawberry guava, *Psidium cattleianum*. *T. ovatus* is a highly specific natural control agent producing leaf galls on strawberry guava that reduce its vigor and fruiting in its native range in Brazil. Strawberry guava exists in balance with other native plants in its native range in Brazil, where it is host to various natural predators and biological control agents. Strawberry guava has no such controls in Hawai‘i, and their absence contributes to this fast-growing tree’s ability to outcompete the native plant species of Hawai‘i, which have both native and introduced predators. The invasion of strawberry guava into native forests has had devastating effects on the biodiversity, cultural resources, scenic beauty, and watershed values of the native forest. Strawberry guava infestations are also a significant source of agricultural pest fruit flies. Introducing a natural biological control agent will help reduce growth and reproduction of strawberry guava, and thus help “level the playing field,” allowing Hawai‘i’s native plants to better compete with the invasive strawberry guava.

Release of the biocontrol agent is proposed on State lands including forests managed by the Hawai‘i Department of Land and Natural Resources, specifically Forest Reserves and Natural Area Reserves where strawberry guava is invading and causing negative impacts. Initial release of the biocontrol agent is proposed in the vicinity of Volcano and the Ola‘a Forest Reserve on the island of Hawai‘i, to be followed by releases in other Forest Reserves and Natural Area Reserves. Eventual occurrence of the insect is expected to extend to invaded forests statewide after distribution by State and Federal agencies. The proposed action requires Plant Protection and Quarantine permits from the USDA, Animal and Plant Health Inspection Service (APHIS) (obtained); a permit for import and liberation of restricted organisms from the HDOA, Plant Quarantine Branch (obtained); and a permit for release and monitoring of the insect on State forest land from the Hawai‘i Department of Land and Natural Resources, Division of Forestry and Wildlife (the trigger for this EA).

Populations of *T. ovatus* are expected to increase to effective levels on the target plant within a few years at release sites. Spread of the insect from the initial release site will occur naturally via wind dispersal and artificially via redistribution efforts by State and Federal agencies involved in strawberry guava management. *T. ovatus* is expected to reduce vegetative growth and fruit and seed production, slowing the spread of strawberry guava over a period of years. The action is expected to have major biological, cultural and economic benefits. Native plant and animal species, including many endangered rainforest species, would benefit greatly due to significant reduction in the competitive ability of strawberry guava relative to native species in Hawaiian forests. This will benefit the biodiversity and ecological values of these forests. Protecting the health and abundance of rare native plants that are severely threatened by strawberry guava will also benefit cultural practices that rely on gathering these plants. Because strawberry guava infestations reduce the quantity of water recharging aquifers, protecting native forests from strawberry guava invasion will benefit watersheds and help maintain supplies of fresh water. Economic benefits in agriculture will ensue from the improved control of pest fruit

flies, for which wild strawberry guava is a major source. Biocontrol will also increase the effectiveness of mechanical and herbicidal control in areas where these techniques can be employed.

Although some in the public have expressed concerns about the adverse effects of strawberry guava control, careful analysis of these concerns indicate that few if any adverse impacts are foreseen. In Brazil, *T. ovatus* has never been found on any agricultural crops, only strawberry guava and one closely related plant (*Psidium spathulatum*, an uncommon wild tree found only in southern Brazil). Evidence from extensive host specificity testing involving about 100 related native, commercial, and ornamental species along with observations of the host range of *T. ovatus* in Brazil indicate that this biocontrol agent will attack only the target weed strawberry guava in Hawai'i. Modern biocontrol requires rigorous testing. Since 1975, 51 biocontrol species (including natural enemies for the weeds clidemia, banana poka, and ivy gourd) have been introduced to Hawai'i without any adverse effects. A biocontrol agent for the wiliwili gall wasp, which has devastated a tree important for both dry forest ecology and cultural uses, was released in November 2008 and is currently being evaluated for success. *T. ovatus* does not kill strawberry guava or taint its fruit. It slows fruit production and spread. The proposed action will impact stands of strawberry guava gradually, allowing more native species to grow back and helping native forests to regenerate. People will still be able to pick fruit and gather the wood, as Brazilians continue to do in their gardens and forests, where the trees are preyed upon by numerous insects. In Brazil strawberry guava is not so rare that people cannot enjoy its fruit, but it is slowed down to a degree that it does not form extensive thickets like it does in Hawai'i. Horticultural oils used to control other scale insects can be used to minimize galls on strawberry guava plants around households, if desired. Populations of native birds and other native animals will not decline. Strawberry guava is one of the greatest threats to Hawaiian forest birds and other native animals, because it displaces native plants that provide essential food and shelter for these species. Some non-native animals, such as birds and wild pigs, eat strawberry guava and spread this invasive species, but none is dependent on strawberry guava for its survival. Substantial decrease in the pig population is unlikely, and hunting will not be adversely impacted and may actually benefit, along with hiking, birding and other activities that depend on forest access, from fewer and less dense thickets.

An alternative to the proposed action considered in this assessment is no action. Under this alternative the insect would not be released on State forest land, and management of strawberry guava would likely be limited to existing methods, which involve herbicides, chopping or bulldozing, all of which have large environmental impacts, are impractical over most of the range of strawberry guava, and are expensive in the limited areas where they are practical.

Because *T. ovatus* is host specific on strawberry guava, and the environmental consequences of its release are expected to be highly beneficial to the native forests and agricultural economy of Hawai'i, and adverse effects will be very limited, the anticipated determination from this EA is a Finding of No Significant Impact (FONSI).

PART 1: PROJECT DESCRIPTION, PURPOSE AND NEED AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Description and Location

The Hawai‘i Department of Agriculture proposes the environmental release in the State of Hawai‘i of a scale insect from Brazil, *Tectococcus ovatus*, Hempel (Homoptera: Eriococcidae) for biological control of strawberry guava, *Psidium cattleianum* Sabine (Myrtaceae). This invasive weed, locally called waiawā, is a critical threat to native forests and the natural and cultural resources they contain throughout the State of Hawai‘i. *T. ovatus* is a highly specific insect that is a natural control agent producing leaf galls on strawberry guava in its native range in Brazil.

Gall-forming insects are common but little-noticed in the environment in Hawai‘i and worldwide. Gall-formers are typically very highly specialized to feed on a single host plant or very narrow range of closely related plant species. In Hawai‘i gall-formers include native insect species, such as the psyllid *Trioza* that feeds on ‘ohi‘a, and the fly species *Phaeogramma lortnocoibon* and *Trupanea*, which feed on *Bidens* (koko‘olau), and *Bidens* and *Dubautia* (kupaoa), respectively. Gall-formers in Hawai‘i also include non-native species such as the wasp *Ophelimus* sp. on eucalyptus, the wasp *Josephiella microcarpae* on banyan, mites on hibiscus, the tephritid fly *Eutreta xanthochaeta* on lantana, and two *Procecidochares* species on pamakani. In all cases these insects and their host plants represent stable, host-specific relationships that have evolved together over many thousands to millions of years.

Release of the biocontrol agent is proposed in State lands including Forest Reserves and Natural Area Reserves managed by the Hawai‘i Department of Land and Natural Resources, where strawberry guava is invading and causing negative impacts. Initial release of the biocontrol agent is proposed in the vicinity of Volcano and the Ola‘a Forest Reserve on the island of Hawai‘i, to be followed by releases in other Forest Reserves and Natural Area Reserves. Populations of *T. ovatus* are expected to increase to effective levels on strawberry guava within a few years at release sites. Spread of the insect from initial release sites will occur naturally via wind dispersal and artificially via redistribution efforts by State and Federal agencies involved in strawberry guava management. *T. ovatus* is expected to reduce vegetative growth along with fruit and seed production, decreasing the spread of strawberry guava over a period of years. *T. ovatus* is known in Brazil to reduce strawberry guava vigor by as much as 25 to 40 percent and fruiting by 60 to 90 percent. Just how fast *T. ovatus* will spread following its release is difficult to predict, but populations of the insect are expected to disperse gradually from release sites, mainly carried by wind. *T. ovatus* is not expected to disperse long distances in the wind except perhaps in rare, major wind events. In addition to purposeful releases on strawberry guava, *T. ovatus* may be dispersed through transport of the tiny insects by humans, most likely on infested strawberry guava plants. Release of this biological control agent at one site in Hawai‘i can be considered equivalent to release over the entire area of the State in which strawberry guava occurs and in which the climate is suitable for reproduction and survival of the insect.

Monitoring will be conducted to determine the rate of insect dispersal and impacts on strawberry guava populations, vegetation change, fruit fly response, and other data. Impacts of *T. ovatus* on non-target species are not expected to occur. However, effects on both strawberry guava and non-target plants will initially be monitored by the U.S. Forest Service, primarily at release sites in native forest plots where density of selected native species will be measured over several years. Releases in experimental plantings of strawberry guava bordered by common guava (*Psidium guajava*) will provide demonstrations of the specificity of *T. ovatus*. Semiannual reports provided to the Hawai'i Department of Agriculture Plant Quarantine Branch will record all findings regarding non-target species. The U.S. Forest Service also has research in progress to study the interaction of mechanical control (cutting and stump-herbicide) and biocontrol. These monitoring studies will provide guidance on future actions, including consideration of distribution methods, alternate biocontrol agents, and combined methods of treatment for certain areas.

The costs of development of the biocontrol project, begun in 1988 with initial exploration in Brazil and extending to recent pre-release monitoring of strawberry guava in forests where biocontrol is proposed, total about \$1.2 million to date. The expenditures were derived from federal and State sources, including \$50,000 for monitoring from the Watershed Partnership Program, which is administered by Hawai'i Department of Land and Natural Resources. The expenditures covered activities such as field research in Brazil, quarantine testing, preparation of permits and petitions, and initial monitoring. The U.S. Forest Service will continue to seek State and federal funding to support its planned monitoring efforts of impacts of strawberry guava and the proposed biocontrol in native forests.

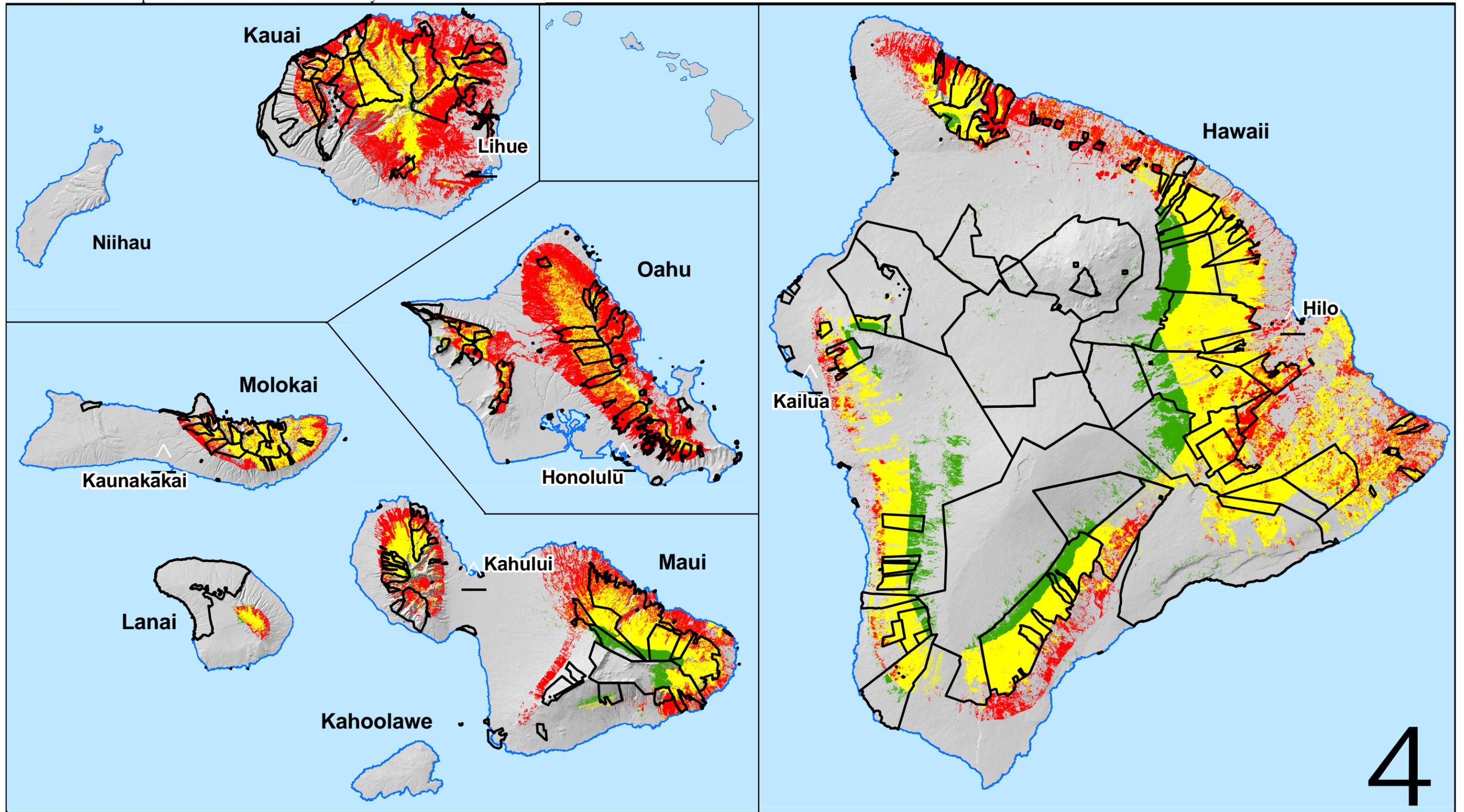
1.2 Purpose and Need

Strawberry guava exists in balance with other native plants in its native range in Brazil, where it is host to various natural predators and biological control agents. Strawberry guava has no such controls in Hawai'i, and their absence contributes to this fast-growing tree's ability to outcompete the native plant species of Hawai'i, which have both native and introduced predators. Since its introduction in the early 19th century, it has become invasive and has gradually expanded into most of the native lowland rainforests, becoming the dominant species over large areas (Figures 1a-c).

The invasion of strawberry guava into native forests has had devastating effects on the biodiversity, cultural resources, scenic beauty, and watershed values of the native forest. The native forests of Hawai‘i are world biological treasures, with over 10,000 native species, the highest rates of endemism in the world, and numerous threatened or endangered species. The biological and water resources of the forest have an important cultural and spiritual dimension for many native Hawaiians, whether they use the forest for hunting, gathering plants for hula or la‘au lapa‘au (medicinal plants), as a source of water for growing kalo, or simply to connect with the pristine natural environment of their ancestors. It also has economic impacts to agriculture, because it serves as a host for massive numbers of fruit flies, and its high growth rates make it difficult and expensive to manage on roadsides, utility corridors, and property boundaries. There is a need to release a host-specific agent for biological control of strawberry guava because chemical and mechanical controls are too expensive and environmentally damaging to apply effectively over large areas, many of which are poorly accessible.

The purpose of establishing *T. ovatus* in Hawai‘i is to reduce growth and reproduction of strawberry guava, thereby limiting this plant’s ability to invade native forests. Introducing a natural biological control agent will help “level the playing field” and allow Hawai‘i’s native plants to better compete with the invasive strawberry guava. *T. ovatus* is expected to reduce impacts of this invasive tree on natural, cultural and economic resources by slowing its growth and spread in native forests, and reducing a key food source of alien fruit fly pests of agriculture in Hawai‘i. *T. ovatus* is expected to reduce vegetative growth and reduce fruit production of strawberry guava, decreasing its spread over a period of years. The action is expected to produce major economic benefits including improved control of pest fruit flies, increased effectiveness of mechanical and herbicidal control, and long-term protection of vulnerable native forest ecosystems from one of their most serious threats.

FIGURE 1a Map of Hawaiian Islands and Strawberry Guava Infestation



Strawberry Guava (*Psidium cattleianum*) Estimated Potential Range

<p>0 25 50 Km</p> <p>0 15 30 Miles</p>	<p> Conservation Areas -includes state forest reserves, state natural area reserves, national parks, and other other protected areas</p>	<p> Likely dense infestation of Strawberry Guava -about 495,000 acres (38% of forested area)</p>	<p> Native forest partially or potentially invaded by Strawberry Guava -about 680,000 acres (52% of forested area)</p>	<p> Native forest not threatened by Strawberry Guava -about 133,000 acres (10% of forested area)</p>
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Strawberry Guava (*Psidium cattleianum*) in East Hawai'i Conservation Areas

-  Conservation Areas
-includes state forest reserves, state natural area reserves, national parks, and other other protected areas
-  Likely dense infestation of Strawberry Guava
-about 24,000 acres (10% of forest) in E. Hawai'i conservation areas
-  Native forest partially or potentially invaded by Strawberry Guava
-about 179,000 acres (76% of forest) in E. Hawai'i conservation areas
-  Native forest not threatened by Strawberry Guava
-about 13,000 acres (14% of forest) in E. Hawai'i conservation areas
- Major Roads
-  Recorded Locations of Strawberry Guava from 1970'2 ground surveys and 2004 roadside survey.

0 5 10 20 Kilometers

0 4 8 16 Miles

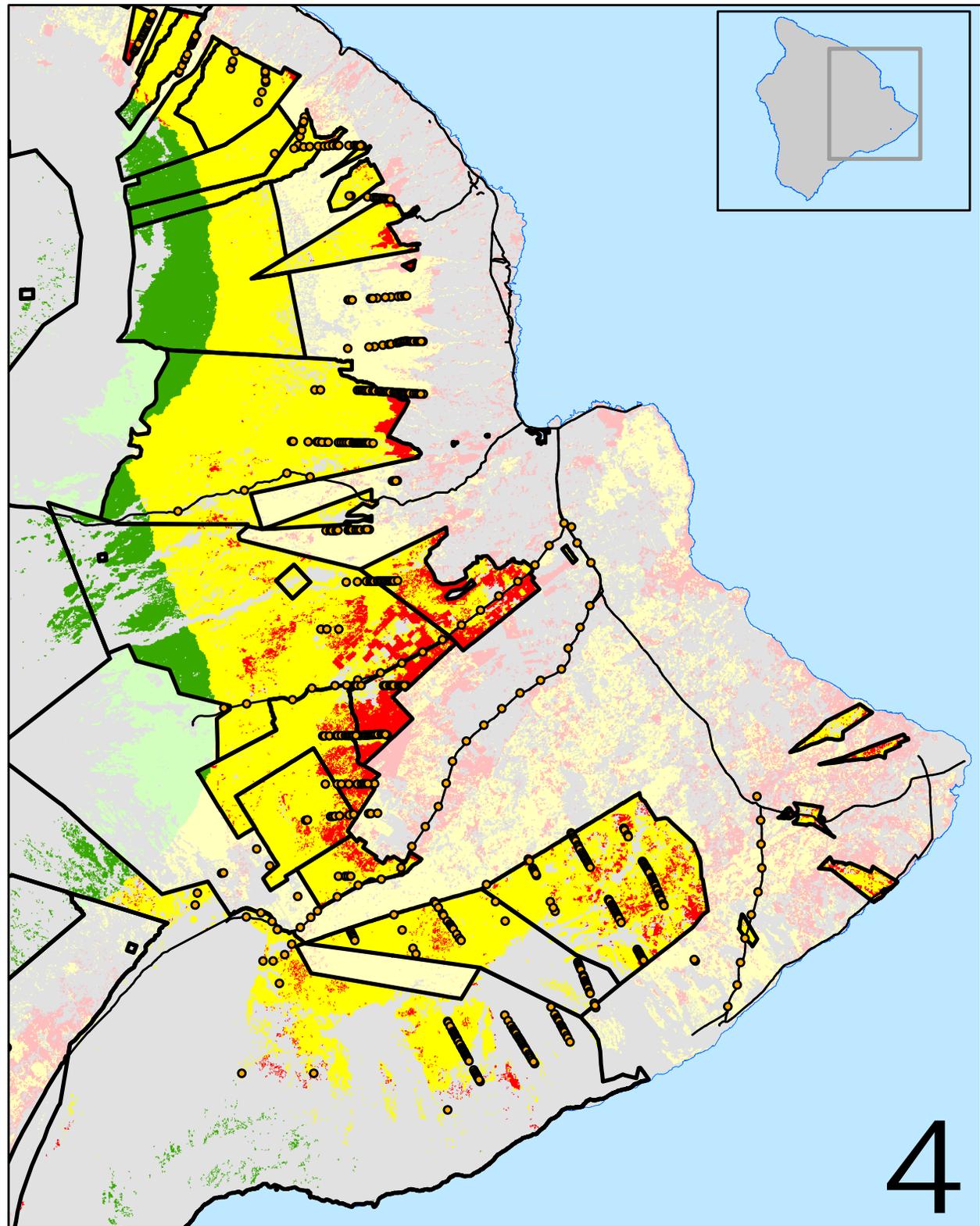
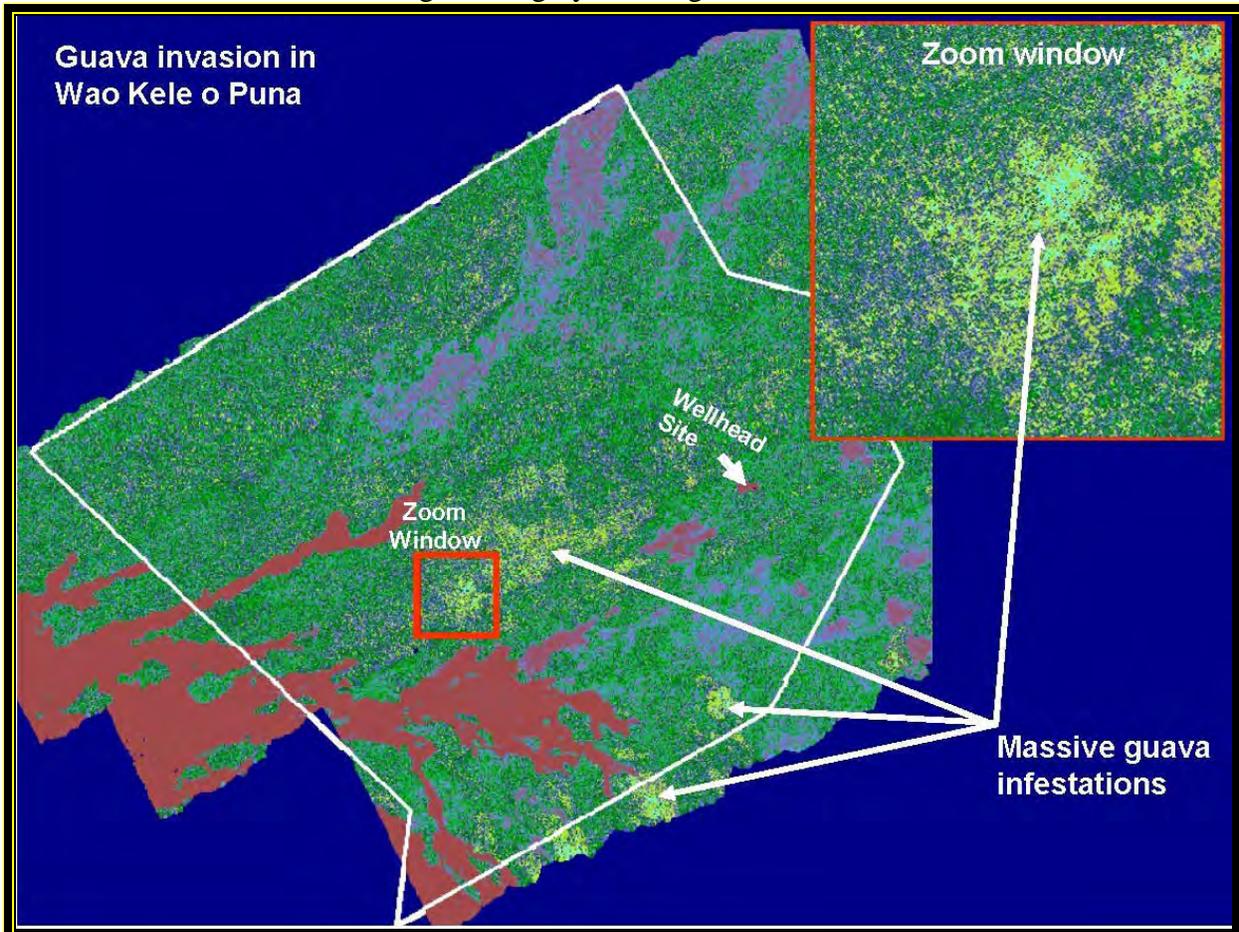


Figure 1c
Aerial Imagery of Strawberry Guava in Wao Kele O Puna



Strawberry guava (dark green) amid 'ohi'a (light green/gray) ▲

Classification of aerial digital imagery showing level of infestation, Wao Kele O Puna ▼



Source: G. Asner, Carnegie Institution

1.3 Background

Strawberry Guava in its Native Range in Brazil

Strawberry guava is native to the Atlantic Forest of southeastern Brazil, extending from Espiritu Santo state in Brazil to Uruguay (20-32° S latitude) (Legrand and Klein, 1977; Reitz et al., 1983). It is a common component of *restingas* (sandy coastal plains with scrub vegetation). It also grows inland at elevations up to about 4,000 feet, usually as a successional species in disturbed areas of native forest (Reitz et al., 1983).

In Brazil, strawberry guava is a small tree, 3 to 16 feet tall, rarely growing to 40 feet (Figure 2a). Trees growing within forests have slender, twisted stems and small crowns, whereas open-grown trees have dense, spreading crowns (Hodges 1988). Strawberry guava usually occurs as scattered individual trees and rarely in small clumps (Hodges 1988). Flowering occurs mainly in November-December, and fruits mature during February-April (Reitz et al. 1983). Yellow and red-fruited varieties occur, but the former is much more common. The red-fruited variety may be distributed primarily above 2,300-2,700 feet in elevation (Hodges 1988; Vitorino et al. 2000). At upper elevations in its southern range in Brazil, strawberry guava persists in subtropical conditions, experiencing repeated winter frosts.

Although not planted commercially on a significant scale, strawberry guava has been cultivated for its fruit and ornamentally, and it has been distributed in Brazil beyond its natural range. It is a popular fuel wood (Hodges 1988). *T. ovatus* forms leaf galls similar to those naturally present on some plants in Hawai'i (e.g., 'ohi'a). Its natural presence on strawberry guava in Brazil does not reduce the plant's usefulness for either fruit or wood (Figure 2).

Figure 2a. Strawberry Guava in a Courtyard in Brazil



Source: USDA Forest Service. These trees in Brazil host the natural predator *T. ovatus* and are still used for fruit.

Figure 2b. Strawberry Guava and Common Guava Side by Side in Brazil



Source: USDA Forest Service. Note leaf galls on strawberry guava (below) and lack of galls on common guava (above)

Strawberry Guava in Hawai‘i

Through purposeful planting of strawberry guava as a fruit tree and ornamental, it has spread in various areas of the world. In many areas of introduction, where no natural biocontrol agents are present, it has become a pest. Beyond Hawai‘i, strawberry guava is recognized as a major threat in native rainforest ecosystems in Mauritius, Reunion, the Seychelles, the Society, Fiji, Norfolk, Palau and Lord Howe Islands (Bajjnath et al. 1982, Smith 1985, MacDonald et al. 1991, Cronk and Fuller 1995, Mueller-Dombois and Fosberg 1998).

Strawberry guava was introduced to Hawai‘i in 1825 and is now common on all the main Hawaiian Islands except Ni‘ihau and Kahoolawe between sea level and approximately 4,000 feet in elevation, particularly in areas of moderate to high rainfall (Wagner et al. 1990). Its highest recorded elevations so far are at 4,800 feet near Kulani Prison on Hawai‘i (Keali‘i Bio personal communication to Tracy Johnson, USDA Forest Service, 2005) and 5,300 feet at Manawainui on Maui (Art Medeiros personal communication to Tracy Johnson, 2005). Unlike its growth habit in Brazil, strawberry guava in Hawai‘i forms dense thickets that eventually exclude all other vegetation (Figure 3).

The fruit of the strawberry guava is often eaten fresh from the tree by Hawai‘i residents, who appreciate the free bounty of overflowing fruit during the fruiting season. It can also be made into juice and other products (Morton 1987). However, commercially produced “strawberry guava” juice typically is not made from strawberry guava but rather a mixture of strawberry puree and common guava (*P. guajava*) puree. Strawberry guava stems sometimes are used as firewood for smoking meat. One resident reported using the leaves for medicine for diarrhea, a use that is usually reported for leaves of the common guava. The plant is sometimes featured in gardens for its smooth multicolored bark, contrasting with shiny, dark green leaves, along with its toleration of pruning and shaping. Potted plants and seed are sold by some horticulturists in Hawai‘i.

Total amounts of fruit produced by strawberry guava trees in Hawai‘i have not been previously estimated, but are likely immense, based on the plant’s widespread distribution and the fruit masses it produces in the absence of predators. Based on unpublished data from the USDA Forest Service’s Julie Denslow, strawberry guava trees in East Hawai‘i alone produce more than 400 million fruit per year, or over 9 million pounds. Most of the fruit in dense thickets is borne high on the tree and in the center of inaccessible areas, and is thus not consumable by humans. Pigs and rats consume some of this mass, but probably the majority remains on the ground and rots, serving as food for alien fruit flies. Although research is ongoing, ornithologists have observed various introduced birds such as Melodious Laughing Thrush (*Garrulax canorus*), Red-billed Leiothrix (*Leiothrix lutea*), Northern Cardinals (*Cardinalis cardinalis*), and Japanese White-eyes (*Zosterops japonicus*) utilizing the fruit; in general, native birds do not consume this fruit, and the prevalence of strawberry guava is one more factor that disadvantages native versus introduced birds in the lowland rainforest (Patrick Hart personal communication to Ron Terry, 2009).

Figure 3. Strawberry Guava Thicket in Hawai‘i



Source: J. Jeffrey. Strawberry guava forms dense thickets that overwhelm and choke out native species.

Effects of Strawberry Guava on Native Forest Ecology

In the words of The Nature Conservancy, a non-profit organization that has been protecting habitat throughout Hawai‘i for many decades:

Hawai‘i’s native ecosystems once extended from the mountains to the sea. Today, the vast majority of Hawai‘i’s native plants and animals find refuge in the upland forests, in large native landscapes scattered throughout the islands. The Islands’ native forests are among the world’s biological treasures, sheltering more than 10,000 native species – more than 90% of which are endemic or unique to these islands. Hawai‘i has almost as many types of native forest as there are U.S. states, including the nation’s only tropical rain forests. ‘Ōhi‘a lehua and koa are the dominant forest types but all total, there are 48 different native Hawaiian forest and woodland types and more than 175 different species of native trees, the vast majority of which are found nowhere else in the world. But today, for all their biological richness, these forests are among the most endangered in the world. Hawai‘i has already lost half of its natural forest cover. Currently, more than one-third of the plants and birds on the U.S. Endangered Species List are from Hawai‘i. When spiders, snails, and insects are included, nearly 60% of Hawai‘i’s total native flora and fauna is endangered, by far the highest percentage of any state. Destruction and the loss of forest habitat are the primary causes of species decline.”
(<http://www.nature.org/wherewework/northamerica/states/hawaii/forests/>)

The loss of ecosystems and the species they contain is biologically unfortunate not only for their own sakes but also for potential benefits to science and medicine that may never occur if they are not sufficiently studied before they are lost.

Over time, more than 900 nonindigenous plant species have become naturalized in Hawai‘i, and almost 100 of them compete very strongly with native species or even completely alter ecosystem processes that change entire communities (Vitousek and Walker 1989). Strawberry guava is one of the most invasive of these species. It forms dense thickets up to 30 feet high, a growth form that suppresses native species, including many that are rare, threatened or and endangered. Because of these characteristics, it is considered one of the state’s most disruptive alien weeds (Hosaka and Thistle 1954, Smith 1985, Huenneke and Vitousek 1990, Wagner et al. 1990, Loope 1998).

Strawberry guava is one of the principal threats in the crisis facing the biodiversity of Hawaiian forests on all islands, which has value for not only ecological but also cultural reasons. Without some form of control, the effects of strawberry guava’s spread on the biodiversity, cultural and watershed values of the native forest in Hawai‘i are likely to be devastating.

The Nature Conservancy has long advocated that biocontrol is ultimately the only hope for combating the choking effects of this invasive species. In the 1991 “Element Stewardship Abstract” for this species, TNC said:

“Strawberry guava is a very serious habitat-disruptive pest in many parks and preserves in Hawaii because of its tendency to form mono-specific stands.... Prolific fruiting, shade tolerance, clonal regenerative strategy, tolerance of heavy litter fall, and possible allelopathic effects contribute to the success of this species. Removal of feral pigs is the sine qua non and first step of successful management of strawberry guava because pigs disperse prodigious quantities of seed. This must be followed by manual, mechanical, and chemical control measures. These have proven successful when tested on a small scale, and recruitment is low in pig-free intact forest, even with dispersal into the treated area from densely infested adjacent areas. Biological control is the long-term management solution to strawberry guava, and the prospect of locating highly specific biocontrol agents is cause for optimism about the future of biological control for this pest. Clarification of the recovery process is the single most important monitoring need” (<http://www.imapinvasives.org/GIST/ESA/esapages/psidcatt.html>)

Effects of Strawberry Guava on Cultural Resources

Strawberry guava infestations may severely impact cultural resources, primarily by degrading the integrity and diversity of native forests and outcompeting and eventually eliminating the rare plant species they contain. Many native trees, herbs, and ferns in the forest provide flowers, leaves, wood, and sap for products such as hula implements and decoration, la‘au lapa‘au (medicinal plants), dyes for kapa, and countless other traditional products. The relationship is far more than simple exploitation of natural resources; in the traditional Hawaiian viewpoint, the natural and cultural, and the physical and spiritual, are not separate, but an integrated whole. The upland forests, now some of the last refuges for native Hawaiian plants and animals, were once considered the dwelling place of the gods. These wao akua regions were sacred. Strawberry guava also degrades landscapes at lower elevations where it negatively impacts Hawaiian “canoe plants” that testify to the long presence of Polynesian people on the land.

Taking care of the land, or malama ‘aina, therefore helps sustain the culture, and the integrity of the ahupua‘a, the forests and the watersheds from mauka to makai, is a critical part of this care. It is for this reason that nurturing outposts of at least limited biological integrity, such as Wao Kele O Puna, now in the care of the Office of Hawaiian Affairs, have been so important to Hawaiian cultural practitioners. If Wao Kele O Puna, along with the other lowland and mid-elevation rainforests of the Hawaiian Islands, degrade into a virtual monoculture of strawberry guava, far more than biological diversity will be lost. Chants and mele that celebrate the sights, sounds and aromas of the forest will have meanings that can no longer be physically experienced. Although foreign woods and foliage can substitute in traditional crafts, at some deep level the power and essence of these products will be diminished.

Effects of Strawberry Guava on Agriculture

Strawberry guava is also a wild host of fruit flies, including the oriental fruit fly and Mediterranean fruit fly, which cost taxpayers and farmers millions of dollars annually in quarantine and eradication efforts (Vargas et al. 1983a&b, Vargas et al. 1990, Harris et al 1993,

Kaplan 2004). Attempts at management of fruit fly pests in Hawai‘i are severely constrained by the abundance of fruiting strawberry guava (Vargas and Nishida 1989, Vargas et al. 1995). According to Roger Vargas, a research entomologist with the U.S. Department of Agriculture, “Working with farmers on the Hawai‘i Fruit Fly Area-Wide Pest Management Program, consistently, with almost every crop we looked at – papaya, mango, cherimoya, and lychee, for example – the number-one problem was the impact of strawberry guava” (Conservation Council for Hawai‘i 2009).

The potential for strawberry guava to sustain fruit flies and ruin other agricultural crops is well known in other locations. For example, the Caribbean Fruit Fly-Free Protocol is a body of regulations under which fresh Florida citrus fruit may be certified free of the Caribbean fruit fly and shipped to those domestic and foreign markets that have established regulations for this pest (<http://www.doacs.state.fl.us/onestop/plt/cfffprotocol.html>). Japan, Bermuda, and the states of California, Hawai‘i, and Texas have accepted this certification protocol, thereby eliminating the need for post-harvest treatments of citrus fruits. Part of the protocol involves having the crops located at least 1.5 miles from strawberry guava, whether wild or within the landscape of a residence.

Current Extent and Future Spread of Strawberry Guava

The current extent of areas in which strawberry guava is adversely affecting the native forest is already significant, as land managers and biologists in Hawai‘i know well. Measuring the exact scale of the infestation is difficult. Figure 1c, above, provides imagery of the Wao Kele O Puna tract on the Big Island, which is owned by the Office of Hawaiian Affairs and managed for its natural and cultural resources. Monoculture stands are easily detectable on normal air photographs, but finding and estimating the extent of strawberry guava beneath a canopy of overhanging trees requires advanced technology. The Carnegie Airborne Observatory carries these instruments on a small airplane whose sensing penetrates the forest canopy to create a kind of “regional CAT scan of the ecosystem”, mapping the forest’s 3-D structure and identifying species. According to the technique’s developer, Greg Asner, “Invasive tree species often show biochemical, physiological and structural properties that are different from native species. We can use these ‘fingerprints’ combined with the 3-D images to see how the invasives are changing the forest” (*Stanford Report*, March 19, 2008).

Although difficult to measure, geographer Jon Price evaluated the extent of strawberry guava in conservation areas through a combination of methods, the statewide results of which are shown in Figure 1a. Reconnaissance by many scientists has demonstrated that there is a very high rate of infestation in lowland alien forests, which are colored red on Figure 1a. At higher elevations are areas that are infested to varying degrees but for which more information is needed, either through the type of aerial imaging referred to above or through laborious ground survey. These areas, colored yellow on Figure 1a, have the potential to become heavily infested. For the Big Island, results of botanical surveys conducted during the 1970s as part of the Hawai‘i Forest Bird Survey and road surveys 30 years later provide ground truth data that indicate that many of the

potential areas already contain light to dense infestations of strawberry guava (“hits” during the survey are shown as orange circles on Figure 1b). Areas that appear to be too high in elevation for strawberry guava to significantly affect the forest are shown in green. Although it is fortunate that strawberry guava does not infest these high elevation areas, it is notable that most of the threatened and endangered plant species are found at the lower elevations where strawberry guava is a threat.

The problem is likely to grow in magnitude and severity. Strawberry guava continues to expand into relatively pristine native forest areas, although it has spread so widely in Hawai‘i that its future impacts are expected to consist largely of filling-in areas where it has reached already (Jacobi and Warshauer 1992). Growth rates of strawberry guava in native forests are very high: at 3,000 feet on Hawai‘i island, average annual increases of over 12 percent in stem density and 9 percent in total basal area have been measured (Julie Denslow, unpublished data). Ecologists have examined the characteristics of the native forest and strawberry guava and envision that without large-scale control efforts, strawberry guava may occupy most of the lowland rainforests of the State. Based on habitat characteristics of sites of existing infestations, strawberry guava has the potential to invade and heavily infest an additional 680,000 acres in conservation lands, and in addition, large areas of private non-conservation lands, where strawberry guava may interfere with forestry, agriculture, archaeological preservation, or other purposes.

Experiences of Land Managers and Field Biologists

Many land managers and working biologists around the State deal with strawberry guava’s threat to the endangered plants, animals and ecosystems in their care on a daily basis. Their experiences provide perspective on the ubiquity and magnitude of the problem, as illustrated in these quotes compiled by the U.S. Forest Service:

“I am a State wildlife biologist for Maui Nui District - I see every day I am in the field doing work in the mountains of Lana‘i, Moloka‘i, or Maui the tremendously urgent need for biocontrol of strawberry guava. I am certain it is one of the very worst of habitat altering, invasive weeds to ever get a foothold in Hawai‘i.”

Dr. Fern P. Duvall, State Wildlife Biologist

“The National Park Service and other land managers in Hawai‘i need more tools to prevent strawberry guava from invading and displacing native forests as densities increase into *P. cattleianum* monocultures. Considerable effort in mechanical and chemical control has been expended by Hawai‘i land managers over the last 20 plus years and still the invasion footprint and native species displacing monoculture formations of strawberry guava are increasing. Mechanical and chemical control can not keep up with the invasion of *P. cattleianum*.”

Steve Anderson, Program Manager for Vegetation, Haleakala National Park.

“Here in West Maui I have witnessed first hand how strawberry guava (*Psidium cattleianum*) can displace native watersheds with single species monotypic stands, displace endangered species habitats, render vast sections of land susceptible to erosion, exhibit broad habitat preferences, spread to the most inaccessible areas, and advance steadily from low elevations toward the pristine forested core of our lands. Since its introduction to the islands in 1825, strawberry guava has grown to become a dominant species within roughly 2-5 thousand acres of West Maui’s Forest Reserve and adjacent conservation lands. Currently strawberry guava is abundant in many places in West Maui up to 2,000 feet elevation, has strong satellite populations up to 3000 feet and is known to exist over 4,000 feet in elevation. The summit of the West Maui Mountains at Pu‘u Kukui stands at 5,788 feet and strawberry guava has been known to grow in elevations in excess of that on other islands. Given enough time and left unchecked it seems entirely possible that strawberry guava could consume vast expanses of the watershed. It seems further evident in my experience that this is also true statewide.”

Christopher Brosius, West Maui Mountains Watershed Partnership Coordinator

“The u‘au or Hawaiian Petrel will probably become extinct because the habitat of the main breeding population which exists on Lana‘i is slowly being destroyed by the strawberry guava. The petrel nests in uluhe on steep hillsides, but strawberry guava is successfully colonizing, and its roots are so dense that the petrels can no longer dig their burrows between them.”

Dr. David Duffy, PCSU Unit Leader, UH Manoa

“Much of my work in the past decade has been trying to foster the development of a sustainable koa forest industry in Hawai‘i. The koa forest at lower elevations in East Hawai‘i is being rapidly invaded by strawberry guava. Currently, harvesting of koa in these forests is unsustainable, because dense strawberry guava regeneration overwhelms the koa regeneration. Although it has been well documented that in natural forests koa can regenerate healthy stands naturally following disturbances and harvests, harvesting in forests invaded by strawberry guava just leads to thickets of the weed. There is too much guava to practically control by chemical or mechanical means. Biocontrol is the only solution. I am working with several large private landowners currently who would like to begin sustainable forestry projects in low-elevation koa forests in East Hawai‘i, but the stumbling block is the presence of the strawberry guava.”

Dr. J.B. Friday, Forester, UH Manoa

“As a technician in conservation efforts throughout the Hawaiian Islands for the past ten years, I have spent countless hours cutting and applying herbicide to strawberry guava growing in endangered species habitat. In the Ko‘olau Mountains, where our agency was responsible for the protection of a number of highly endangered, rare, endemic plants, we were extremely discouraged by the waiawī’s ability to resprout from cut saplings. We would helicopter into remote areas, spend three days camping, spending the entire time “killing” waiawī --but when we returned to follow up, it was like we had done nothing! The large piles of cut stems sprouted roots and new growth, and the forest floor was a

carpet of keiki waiawā! We spent thousands of dollars, used gallons of polluting herbicides, and were unable to maintain even a stand-off with this invasive weed. Endangered plants are unable to coexist with this weed--in the darkness under a stand of strawberry guava, NOTHING else grows.”

Springer Kaye, UH Hilo TCBES graduate program

“I regard strawberry guava as perhaps having done more destruction to endemic forest species in the state of Hawai‘i over the past century than any other invasive plant. We on Maui are so committed to stopping the as yet very limited invasion of *Miconia calvescens*. We recognize, however, that strawberry guava has very similar impacts to miconia but is far beyond mechanical and chemical control and is much more widespread than miconia and still spreading.”

Dr. Lloyd Loope, USGS Pacific Island Ecosystems Research Center Haleakala Field Station

“I reside in an older lowland forest kipuka where several dense stands of mature lama (*Diospyros sandwicensis*) can be found among towering ‘ohi‘a lehuas. Last year, at least twelve mature lamas on the property, which were 30-40’ tall and up to 2’ in diameter, died suddenly. I contacted J.B. Friday and Dr. Scott Nelson, both of CTAHR, who determined that an infestation of strawberry guava was probably to blame. They believe that during this period of drought, the massive surface roots of the strawberry guavas may have deprived these lamas of crucial soil moisture and nutrients, causing their deaths. Since then, I have worked with the property owners to eradicate this noxious weed. However, even on eleven acres, this is proving to be a daunting task.

Mitzi Messick, landscape designer

“My own experience and publications have shown that strawberry guava is a highly invasive species that is actively excluding native species and is altering the way that Hawaiian forests function. I am finding strong evidence that the shade produced by strawberry guava and other species is impeding native species regeneration. I believe the consequences of inaction will lead to wholesale transformation of Hawai‘i’s low and mid-elevation wet forests into alien-dominated forests that function very differently in terms of providing nutrients, water, and other ecosystem services. This alteration of function will lead to greater invasion of plants and animals in Hawai‘i’s forests and a loss of native biodiversity.”

Dr. Rebecca Ostertag, Ecologist, UH Hilo

“In the past three decades I have seen *Psidium cattleianum* go from being a serious invasive to becoming a biological catastrophe for ‘ohi‘a forests. They have gone from being rampant invaders, to completely replacing native forest, including the forest floor, the understory, and soon will replace the dwindling canopy in many areas. I don’t see much future for wet forests, where strawberry guavas have invaded, unless there is some sort of control.”

David Paul, President Big Island Native Plant Society

“As the Maui District Endangered Species Research Specialist I am engaged in work to enhance Hawaiian petrel (*Pterodroma sandwichensis*) habitat on the island of Lana‘i. I see strawberry guava as the most significant threat to the continued viability of the Hawaiian petrel colony on Lana‘i. We are using manual control methods, and herbicide applications to address the invasion of this plant. We need every available tool if we are to preserve Lana‘ihale as a petrel colony and as a watershed. The scope of the problem is so great that without biocontrol to add to our tool bag we face a nearly impossible task of habitat restoration.”

Jay Penniman, Maui District Endangered Species Research Specialist, Hawai‘i DLNR

“As a bird lover and wildlife biologist who has worked for the state and federal governments, I’ve learned the harm this plant can do and understand that in order to control it over so many thousands of acres a tool like biological control is badly needed. I’m especially concerned that this guava is destroying the habitat of some of our native birds, especially the native honeycreepers that rely on native trees and shrubs to supply them with nectar, which guava cannot do. Strawberry guava also seems to be suppressing the regeneration of ‘ohi‘a trees. Nearly all the native forest birds need ‘ohi‘a trees to nest in, but they do not build their nests in strawberry guava because it doesn’t afford the same degree of shelter.”

Dr. Thane Pratt, USGS Pacific Island Ecosystems Research Center Kilauea Field Station

“The goal of our partnership is the protection of forested watershed on Kohala Mountain. Strawberry guava (*Psidium cattleianum*) is one of our priority weeds... We have seen the speedy spread of this weedy tree not only near areas of human disturbance, but also into the forest, where it is able to establish in closed canopy forest areas far from people. In these environments, it has the capacity to completely overtake native trees and to change the structure and function of the native habitat. Additionally, it is expensive and difficult to control with mechanical and chemical means.”

Melora Purell, Coordinator, Kohala Watershed Partnership

“My observations over the last 38 years indicates the dying out of native forests in many areas of O‘ahu due to the continued spread of strawberry guava and other weeds, among other factors... Strawberry guava leaf litter also is extremely poor habitat for the native terrestrial snail species. Wherever strawberry guava has spread, the native terrestrial snails have declined or died out.”

Dr. Daniel Chung, Biologist, former Nature Conservancy and Bishop Museum

Modern History of Biocontrol in Hawai‘i

Many people have the mistaken impression that a sugar plantation owner’s ill-fated import of mongooses to control rat populations is a typical example of biocontrol. Actually, biocontrol is the careful and scientific introduction of an organism to control the growth or spread of an invasive organism. In the case of invasive plants, these biocontrol agents are natural enemies of

a plant in its home range that feed on or damage a part of the plant, making it easier to manage. Biocontrol can reduce the abundance of an invasive species gradually but cannot eliminate it completely. Whereas chemical and mechanical approaches require perpetual and often expensive maintenance, can inflict undesirable side effects, and are ineffective in areas of inaccessible terrain, biocontrol offers a cost-effective and long-lasting tool to control invasive species in natural habitats. Biocontrol is an accepted management practice in over 100 countries, including the United States. Modern biocontrol involves extensive research to identify predators that are specific to a given invasive plant or animal, including years of laboratory and field testing of the potential biocontrol agent under rigorous protocols (Wapshere 1974, Balciunas and Coombs 2004). Only at the end of this process do state and federal agencies carefully consider a proposed release and approve permits, as described in Section 1.4 for *T. ovatus*.

The long history of biocontrol of invasive species in Hawai‘i dates back to the 1890s, when the Territorial Board of Agriculture and Forestry began looking in Mexico for insects and diseases of lantana (*Lantana camara*). Initial introductions of lantana enemies in 1902 were followed in the 1950s and 60s by additional species. The eventual result was establishment of more than 20 enemy species which varied in effectiveness depending on environmental conditions but led to successful suppression in many areas (Davis et al 1992). This example illustrates that for widespread problems and difficult species, multiple agents may be necessary. Another early success story was biocontrol of prickly pear cactus (*Opuntia* spp.). Over 66,000 acres on Parker Ranch alone became infested with the cactus. By 1965, less than 8,000 acres remained infested, thanks to three introduced insects and an accidentally introduced fungal disease. These enemies still occur on scattered cactus today, illustrating that even dramatically successful biocontrol efforts do not “wipe out” the target species, but rather suppress it to acceptable levels. Hamakua pamakani (*Ageratina riparia*) is an aggressive, fast-spreading, noxious weed that became an extreme pest in Maui and Big Island range lands during the first half of the 20th century. By 1960, it was crowding out native plants in Hawai‘i Volcanoes National Park. After introduction of insects from Mexico and a foliar fungus from Jamaica, Hamakua pamakani was well controlled (Davis et al 1992).

In the Hawaiian Islands, 708 biocontrol agents were released between 1890 and 1999, of which 286 became established. Most of these introductions helped control their target species, which were mainly insect pests of agriculture (Reimer 2002). About 60 biocontrol agents were established during this period targeting 20 invasive plant species (some shown in Figure 4). In the early years, some biocontrol agents also attacked non-targeted pests or in some cases native and/or beneficial species. As the rigor and oversight of scientific testing improved, so did the safety of biocontrol introductions. Before 1944, when the Board of Agriculture started reviewing applications, only 54.7 percent of the agents were host specific. Between 1944 and 1975 that percentage increased to 77.4. Since 1975, when a group of three expert committees started reviewing all applications, host specificity has been 100 percent (Reimer 2002).

As illustrated by the following three cases, while biocontrol by itself may not completely solve the problems with any given invasive species, modern biocontrol efforts in Hawai‘i have been remarkably successful:

- Koster’s curse (*Clidemia hirta*) is a shade-tolerant weed often found along trails and other areas in the forest. Originally from tropical America, its seeds are spread by birds (Motooka et al. 2003). In some areas it forms dense thickets in the lower herb layer, choking out natives. Biocontrol has made some inroads against this pest. In open rangeland, the thrips *Liothrips urichi* has helped control it substantially. Although the leaf spot fungus (*Colletotrichum gloeosporioides*) has helped to some degree, and various insect species are under study, control in lowland rainforest requires additional work (Conant 2002).
- Ivy gourd (*Coccinia grandis*) can densely blanket vegetation in residential neighborhoods and farms, and the heavy vines hanging on electrical and telephone lines pose severe problems for utility companies. In addition, ivy gourd fruits are a host for the agricultural pest melon fly (*Bactrocera cucurbitae*). Several insect biocontrol agents from Kenya have been introduced into Hawai‘i for this pest (Chun 2002). Impacts are now evident from a clearwing moth released in 1996, *Melittia oedipus*, whose larvae bore into the mature vines and roots, and a small leaf mining weevil, *Acythopeus cocciniae*, released in 1999. There is noticeably less ivy gourd in many locations around the State, including Kona (Pat Conant personal communication to Ron Terry, 2009).
- Banana poka (*Passiflora tarminiana* [formerly *mollissima*]) is an aggressive vine from South America that smothers mid- to upper elevation native forests with dense mats of stems and foliage which can damage even large trees. Banana poka is a threat to koa forestry because the prolific vines block natural regeneration of this valuable native tree. Beginning in the early 1980s State and Federal entomologists and plant pathologists explored Colombia, Ecuador and Venezuela in search of potential biocontrol agents, and several agents were imported to Hawai‘i under quarantine for testing. After testing, some insect species were released but had little effect. A fungus, *Septoria passiflorae*, was released in 1996 and worked well in the upper Laupahoehoe area of the Big Island, assisted perhaps by a long drought (Trujillo et al. 2001, Smith et al 2002; Steve Bergfeld personal communication to Ron Terry, 2009). Scientists continue to investigate ways to use biocontrol in areas where banana poka remains a major pest, including Kula Forest Reserve and Polipoli State Park in Maui.

In summary, Hawai‘i’s native ecosystems and the plants and animals they contain, as well as agriculture and grazing, have benefited enormously from successful biological control efforts. Over 50 biocontrol agents have been released in Hawai‘i against insect and weed targets since strict regulatory processes were established in the 1970s, and none has switched hosts to non-target species or become invasive themselves (Reimer 2002).

Figure 4. Invasive Plants Managed Using Biocontrol in Hawai‘i



Clockwise, from Upper Left: Lantana, Prickly Pear, Clidemia, Ivy Gourd, Banana Poka and Pamakani. (All images from Kim and Forest Starr)

1.4 Environmental Assessment Process and Environmental Permits

Basis for Environmental Assessment

This Environmental Assessment (EA) was prepared in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS) by the Hawai‘i Department of Agriculture (HDOA), which is the proposing agency, with assistance from the U.S. Department of Agriculture (USDA), Forest Service, Institute of Pacific Islands Forestry (herein called the U.S. Forest Service). The trigger for the EA is expenditure of state funds by HDOA in conducting the proposed release, as well as use of State lands. As the release would take place on State land under the control of the Hawai‘i Department of Land and Natural Resources (DLNR), the Draft EA reported that that agency would be acting in the context of Chapter 343, HRS, as the approving agency. Since that time, DLNR and HDOA have determined that HDOA should act as both proposing and approving agency. DLNR has continued to assist in the review of the Draft and Final EAs. Chapter 343, HRS, along with its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact assessment process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria. Part 4 of this document states the anticipated finding that no significant impacts are expected to occur; Part 5 lists each criterion and presents the findings by the approving agency. After considering comments to the Draft EA, HDOA has concluded that no significant impacts would be expected to occur and has issued a Finding of No Significant Impact (FONSI), as discussed in Parts 4 and 5.

Previous Environmental Documentation

In May 2005, the U.S. Forest Service initially proposed the release of *T. ovatus* to slow the spread of the invasive strawberry guava in Hawai‘i. The proposal followed a decade of laboratory and field experiments conducted in both the insect’s native Brazil and in quarantine facilities in Hawai‘i. A federal EA was prepared by the USDA Animal and Plant Health Inspection Service (APHIS). The public was notified through local newspaper articles, research updates dispensed as hard copies and on the Institute of Pacific Islands Forestry website, occasional presentations to various stakeholder groups, public meetings sponsored by the Hawai‘i Department of Agriculture as part of the permitting process, and advertisement of the availability of the federal EA in local newspapers. Following review by State and Federal regulators (a process which lasted 3 years), permits for the release were issued in April 2008.

Compliance with the State of Hawai‘i EIS law, Chapter 343, HRS, and its implementing regulations at 11 HAR 200, was triggered by the proposed release of *T. ovatus* on forest lands managed by the Hawai‘i Department of Land and Natural Resources. An additional EA attempting to address Hawai‘i EIS law was prepared by the U.S. Forest Service and published on April 23, 2008. Analysis by the U.S. Forest Service and DLNR indicated that this first State of Hawai‘i Draft EA had an erroneous listed applicant and failed to adequately encompass the scope of the action or address all pertinent impacts; it was decided to completely withdraw this

EA. The original State of Hawai‘i EA was withdrawn and the current document was prepared, with a new (and correct) proposing agency, a new title and scope, and expanded consideration of impacts. Since 2008 it has been the standard practice of the Hawai‘i Department of Agriculture to prepare a State of Hawai‘i EA for any biocontrol release conducted by the Department.

Environmental Permits

The proposed action requires Plant Protection and Quarantine permits from the USDA, Animal and Plant Health Inspection Service (APHIS) (obtained April 4, 2008, and March 23, 2011); a permit for import and liberation of restricted organisms from the HDOA, Plant Quarantine Branch (obtained April 7, 2008, and renewed March 16, 2011); and a permit for release and monitoring of the insect on State forest land from the Hawai‘i Department of Land and Natural Resources, Division of Forestry and Wildlife (an additional trigger for this EA).

Conditions for environmental release of *T. ovatus* in Hawai‘i have been established by the Hawai‘i Department of Agriculture under the provisions of Hawai‘i Revised Statutes (HRS), Chapter 141, Department of Agriculture, and Chapter 150A, Plant and Non-Domestic Animal Quarantine. The release has been following review and approval by the Hawai‘i Board of Agriculture in consultation with the Advisory Subcommittee on Entomology and Advisory Committee on Plants and Animals (Appendix 1, Part 6).

After completion of the EA, the Hawai‘i Department of Agriculture is expected to apply to the Hawai‘i Department of Land and Natural Resources, Division of Forestry and Wildlife, for a permit for release and monitoring of the insect on State forest land under HRS Chapter 171, Public Lands, Chapter 183, Forest Reserves, and Chapter 195, Natural Area Reserves System.

1.5 Public Involvement and Agency Coordination

Public outreach has continued throughout this process through a series of formal and informal meetings, as well as phone and email communications with parties who have inquired about the action. The U.S. Forest Service has maintained a website on the issue that describes the development of biocontrol for strawberry guava and features frequently asked questions and photo galleries: <http://www.fs.fed.us/psw/programs/ipif/strawberryguava/>.

A series of open house meetings was hosted by the U.S. Forest Service in 2009 to provide opportunities to learn about and discuss the threat strawberry guava poses to native Hawaiian forests and the proposed use of biocontrol to manage the species, as well as to gather citizen input for this EA. The meetings were held from 5:30 to 7:30 PM at:

- Maui - April 27, at the Maui Arts and Cultural Center in Kahului;
- Kaua‘i - April 29, at Chiefess Kamakahelei Middle School in Lihue;
- O‘ahu - April 30, at McCoy Pavilion at Ala Moana Park, Honolulu;
- Hawai‘i Island, Hilo - May 14, at the University of Hawai‘i at Hilo, Room UCB 127; and
- Hawai‘i Island, Kona - May 18, at NELHA Gateway Center, Kailua-Kona.

The meetings had an open house format and included opportunities for attendees to provide written comments for consideration during EA preparation. Issues raised in these comments are included in those summarized in Table 1, below. Scientists from the Institute of Pacific Islands Forestry, the Hawai‘i Department of Agriculture, Hawai‘i Invasive Species Council, and other agencies assisted in the meetings.

In addition, the U.S. Forest Service and its consultants engaged in a series of informal meetings with a variety of groups and individuals between March 1 and May 16, 2009.

List of Consulted Parties

A partial list of those from whom information and comments were solicited and/or presentations were made include the following:

Individuals and Organizations:

Amy Greenwell Ethnobotanical Garden
Big Island Invasive Species Council
James Cuda, University of Florida, Entomology & Nematology Department
Edith Kanaka‘ole Foundation
Entomological Society of America

Hawai‘i Watershed Partnerships
Hawaiian Entomological Society
Christopher J. Hodgson, The National Museum of Wales
Kanaka Council
Jose Henrique Pedrosa Macedo, Universidade Federal de Parana, Curitiba, Brazil
Maui Conservation Alliance
Na Oihi Olino (OHA sponsored)
Jamie Reynolds, Plant It Hawaii
Rotary Club of Volcano
Rotary Club of Hilo
Bryan Sagon, Guava Consultant
Sierra Club, Hawai‘i Chapter
Sierra Club Moku Loa Group Executive Committee
Clifford Smith, University of Hawai‘i at Manoa, Botany Department (retired)
The Nature Conservancy
Three Mountain Alliance
Eric Vanderwerf, Pacific Rim Conservation
Marcelo Vitorino, Universidade Regional de Blumenau, Brazil
Weed Science Society of America
Frank Wessels, University of Florida, Entomology & Nematology Department
Charles Wikler, Universidade Estadual Centro-Oeste, Irati, Brazil

County Agencies and Officials:

Hawai‘i County Councilmembers Dominic Yagong, Bob Jacobson, Pete Hoffman, Brenda Ford,
Guy Enriques and Dennis Onishi
Hawai‘i County Council IGRPW Committee

State Agencies and Officials:

Department of Agriculture, Advisory Subcommittee on Entomology, Advisory Committee on
Plants and Animals
Department of Agriculture, Plant Pest Control Branch
Office of Hawaiian Affairs
Representative Clift Tsuji
Senator Lorraine Inouye
University of Hawai‘i at Hilo
University of Hawai‘i at Manoa, College of Tropical Agriculture and Human Resources

Federal Agencies and Officials:

Hawai‘i Volcanoes (HAVO) National Park
Haleakala National Park
Representative Maizie Hirono
Senator Daniel Akaka
U.S. Fish and Wildlife Service, Pacific Division of Ecological Services
U.S. Geological Survey, Pacific Island Ecosystems Research Center, Kilauea and Haleakala
U.S. Natural Resources Conservation Service, Dave Clausnitzer

Issues Identified to Date

Table 1 identifies the principal questions and concerns identified by parties in communications related to the withdrawn EA, in communications outside the EA process, and in public meetings. The table also includes a brief summary of the response of the Hawai‘i Department of Agriculture to each concern, referenced to locations in the Draft EA, where applicable, where the issue is discussed.

Table 1
Summary of Issues Raised During Consultation

Question or Concern	Response of Hawai‘i Department of Agriculture
<i>T. ovatus</i> (“the insect”) may jump to attack other plants, particularly Myrtaceae, or valuable crop plants such as coffee, common guava, mango, or papaya.	The insect is highly specific and has been rigorously tested on over 100 plants, including close relatives (App. 1). In its native range <i>T. ovatus</i> has never attacked agricultural crops
The insect may evolve such abilities.	The time scale of evolution is very long; at such scales, thousands of species of insects have opportunity to evolve such characteristics. Gall-forming insects are actually more constrained in potential for evolutionary shifts than most other insects, because of their close interaction with their host plants. (Sec. 3.1.2)
The insect will be a pest to humans (like a gnat) and will be make life “miserable”.	This insect spends almost all its life attached to a leaf without moving. Females cannot fly or even leave their galls; males are weak fliers that live only about 2 days and have never been known to swarm or bother humans in any way.
The insect may multiply out of control to extreme densities.	Like any other highly host-specific plant feeders, <i>T. ovatus</i> populations are limited by the abundance of their host plant. As a gall-former, this insect is further limited naturally by abundance and accessibility of the new leaf tissue on which it forms galls.
<i>T. ovatus</i> may prove to be an allergen.	Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not known to be an issue.
The insect’s natural predators or pathogens may come to Hawai‘i and harm native insects.	<i>T. ovatus</i> has 3 highly specialized enemies in its native range. One of these (a tiny parasitic wasp) is widespread around the world and may already occur in Hawai‘i. This wasp’s host relationships are poorly known (populations occurring in Hawai‘i may be unable to feed on <i>T. ovatus</i>), but it utilizes only soft scale insects, most of which are considered pests (Sec. 3.12)
Scale insects (like <i>T. ovatus</i>) commonly stimulate ant populations by providing them food (honeydew).	Not all scale insects produce honeydew. <i>T. ovatus</i> does not, and no association with ants has ever been observed for this insect in its native range.
We will lose fruit for food (jams, jellies, wine, sauces, lemonade), affecting our sustainability.	There will still be fruit, especially on isolated trees and shrubs, and individual trees and shrubs can be protected by horticultural oil sprays, including natural oils (Sec. 3.2.1).
It will reduce food for wild pigs, negatively impacting pig populations, pig hunting and the food this produces; alternatively: it may drive pigs into people’s gardens and farms to get food. <u>A commenter on the Draft EA suggested that reduced fruit could lower quality of pig meat.</u>	Strawberry guava fruit, though seasonally abundant, is a relatively minor component of the diet of pigs, which are very adaptable. <u>Pigs are affected by many other variables in the environment besides strawberry guava fruit, so while reduction in fruit could affect pigs under some conditions, widespread decline in quantity or quality of pig meat appears unlikely.</u> Hunting in some areas could benefit as result of better access conditions (Secs. 3.1.2 and 3.5). Reduction of wild fruit near homes may reduce pigs and the damage they sometimes cause to gardens and residential landscapes.

Table 1, continued	
Biocontrol will cause loss of wood for smoking, furniture, fuel source, mulch.	The insect will not kill trees, but only reduce vigor and growth. Given the scale of the densest infestations, tens of thousands of acres with tens of millions of trees, wood will continue to be superabundant (Sec. 3.5).
Galls will make the trees ugly, affecting property values and tourism.	The galls are only visible close-up, and will not reduce the attractiveness of groves. Trees in Brazil are attractive in spite of galls. 'Ohi'a trees have leaf galls (from a native insect) yet remain attractive (Sec. 3.6).
There will be a cumulative scenic impact when added to problems with rose apple and wiliwili.	<i>T. ovatus</i> does not produce severe defoliation or other effects highly visible on the level of the problems with wiliwili and rose apple; the impacts would thus not tend to accumulate (Sec. 3.6).
Insect will ruin value of trees as windbreak or privacy screening.	The insects do not defoliate but instead produce leaf galls. Vigor of new growth may be reduced, for example after pruning, but this can be remedied by planting other, less environmentally harmful trees (Sec. 3.2.5).
Strawberry guava leaves can be used medicinally to treat diarrhea, <u>or to develop beneficial pharmaceuticals.</u>	Traditional diarrhea medicine usually involves common guava leaves, not strawberry guava. In any case, leaves will continue to remain superabundant. The gall areas can simply be cut away or leaves without galls can be used (Sec. 3.5).
Wood can be used for sticks in hula and lomilomi, and as an 'o'o.	The wood will remain superabundant and these uses will not diminish. Native trees that were the original materials for these tools will be allowed to continue to survive, for potential use in the future (Sec. 3.4).
Strawberry guava provides habitat for native birds and bats, <u>and also may play a role in sustaining non-native birds, lizards and mammals.</u>	Strawberry guava thickets are poor habitat for native species. Degradation of native forests by strawberry guava is a primary threat to native plants and animals (Sec. 3.1.3-5)
Infested strawberry guava will despoil the beauty of the forest.	Visual impacts to strawberry guava will be minor, but increased and healthier native plants will have a large scenic benefit in the forest (Sec. 3.6).
Worse invasive plants will replace strawberry guava.	Ecologists and land managers feel there are currently very few plants as invasive as strawberry guava (Sec. 1.3). Because the insect does not kill trees, but only reduces vigor and growth, existing stands of strawberry guava will not be rapidly displaced.
Doesn't strawberry guava control erosion and help recharge the islands' aquifers?	In fact, strawberry guava allows less recharge to the aquifer than does native forest. Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil holding species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion. (Sec. 3.3).

Table 1, continued	
Strawberry guava produces oxygen to combat vog.	All plants produce oxygen, and all other things equal, native plants are preferable.
It would be better to manually remove it, or use some combination of manual and herbicide control. Volunteers or prison labor could do this. Or we could create a whole industry out of this, with the value of the wood paying for the eradication.	1) A great part of the infestation is in very difficult terrain, far from roads, dangerous and ecologically sensitive; 2) The required labor is extremely substantial; for East Hawai‘i alone, it would cost hundreds of millions of dollars and require thousands of full-time workers (Sec. 2); 3) Strawberry guava wood is of limited value, and there is no use that could pay for more than a small fraction of removal costs in most areas (Sec. 3.2.4).
How about girdling trees? Tethering goats near seedlings?	Such methods could have limited value in small areas, but cannot play any large role in wide scale control across hundreds of thousands of acres (Sec. 2).
Strawberry guava would make a great biomass resource.	Current research indicates that despite its prevalence, strawberry guava is a poor candidate for biofuel (Sec. 3.2.4). Efficient harvesting (e.g. by bulldozer) would cause substantial ecological damage, and access is a severe challenge for the vast majority of affected areas.
Strawberry guava doesn’t really hurt the forest, and besides, there are other priority plants for biocontrol: Albizia, Tibouchina, Clidemia, maile pilau, autograph tree.	Conservation professionals in Hawai‘i agree that strawberry guava is the worst or nearly the worst invasive plant threatening Hawaiian forests (Sec. 1.4)
Strawberry guava only appears in disturbed areas.	Disturbance does promote strawberry guava, but it also has steadily invaded deeply into our most pristine forests and will continue to do so unless it is controlled.
Strawberry guava is not a source for fruit flies and control of this plant will have no effect on fruit fly density.	On the contrary, strawberry guava fruits are a significant host of fruit flies and many fruit growers and agricultural officials support keeping it under control (Sec. 3.2.3).
There will be increased risk of rockfall along roads and highways where strawberry guava helps hold the soil and rock, e.g., Hana Highway and the Pali Highway.	Strawberry guava trees will not be killed by <i>T. ovatus</i> . Gradual decline in the vigor of existing thickets will allow replacement by other species and will not cause catastrophic mass wasting (Sec. 3.3).
Biocontrol never works: heed the lesson of the mongoose and rat.	Over 50 biocontrol agents have been released in Hawai‘i against insect and weed targets since strict regulatory processes were established in the 1970s, and none has switched hosts to non-target species or become invasive themselves. Recent notable successes include biocontrols for banana poka and ivy gourd (Sec. 1.3).
Biocontrol is theoretically OK, but we just don’t need another insect in Hawai‘i.	Biocontrol introductions, which are rigorously studied and regulated, have a proven track record of safety and effectiveness. They are a truly necessary tool for our worst invasive species. <i>T. ovatus</i> in particular offers tremendous potential benefits to both native forests and our agricultural economy.

Appendix 4 contains written comments on the Draft EA and the responses to these comments. Various places in the EA have been modified to reflect input received in the comment letters; additional or modified non-procedural text is denoted by double underlines, as in this paragraph.

PART 2: ALTERNATIVES

This section will explain the two alternatives available: the action alternative, for ~~DLNR to issue a permit for release and monitoring~~ HDOA to conduct releases of the *T. ovatus* insect on State forest land; and no action (not ~~issuing this permit~~ releasing *T. ovatus* on State lands).

Although these alternatives are limited to a decision on whether to release *T. ovatus* in Hawai‘i, other methods can be used for control of strawberry guava. Some are presently being used by public agencies and private organizations and individuals to control infestations in limited areas. These are described last in this section in the context of alternatives evaluated but dismissed from further consideration, as they did not meet the purpose of effectively reducing the damaging effects of infestations of strawberry guava in large areas of the Hawaiian Islands.

2.1 Proposed Action

Under this alternative, Hawai‘i Department of Agriculture ~~DLNR~~ would ~~issue a permit for release and monitoring~~ of the insect for the control of strawberry guava on various lands in the State, including Forest Reserves and Natural Area Reserves throughout the State of Hawai‘i, an action which has already received the necessary field release permits from the Hawai‘i Department of Agriculture and USDA-APHIS (see Appendix 1). Conditions for environmental release of *T. ovatus* in Hawai‘i have been established by the Hawai‘i Department of Agriculture (Appendix 1, Part 6). Release and monitoring on State forest land would also require a permit from the DLNR, Division of Forestry and Wildlife.

2.2 No Action Alternative

Under the no action alternative, ~~DLNR-HDOA~~ would not ~~issue a permit for release and monitoring~~ of the insect on State forest land for the control of strawberry guava. The limited chemical, cultural, and mechanical control methods currently practiced by other agencies and individuals around the State would continue under the no action alternative, but they would likely be ineffective in controlling strawberry guava on a landscape level (see next section).

2.3 Alternatives Evaluated and Dismissed from Further Consideration

Areas for Release of Biocontrol Agent

Sites considered for release of the insect include State and federally managed forests and research sites on each of the main Hawaiian Islands where strawberry guava occurs. Although release at any of these sites has been permitted by the Hawai‘i Department of Agriculture and USDA-APHIS (Appendix 1), release is proposed specifically in lands managed by the Hawai‘i DLNR because large areas of these State lands are under immediate threat from invading strawberry guava (see Figures 1a, 1b). If releases were not conducted in DLNR-managed forests, but were conducted on land outside these areas, the biocontrol agent would likely spread into the State-managed forests over time by means of natural dispersal. Therefore, restricting

release to areas outside of State-managed forests would probably delay though not eliminate the potential effects of biocontrol of strawberry guava in State forest lands, resulting in further degradation of native forests as described under the no action alternative.

Another alternative for deploying the biocontrol agent would be to restrict its release to one island or one forest area within an island. This option might be considered useful for limiting the risks of a particular biocontrol until such a time that they might be better understood and mitigated. However, benefits and risks of biocontrol are typically consistent across the State, and movement of organisms within the State is often difficult to control. Like most insect species that establish in Hawaii, populations of the proposed biocontrol agent are expected to extend over time to all areas where there is suitable habitat. Limiting an insect species to one remote site is not realistic based on past experience. In the case of strawberry guava, using biocontrol as an additional management tool is expected to produce benefits that extend statewide (Part 3 in this document). Also, given that the risks of using biocontrol have been evaluated at a statewide level and determined to be minimal by State and federal regulatory processes for biocontrol introductions, restricting release of the biocontrol agent to a single area does not appear to have any significant mitigating effect in the long term.

In the short term (over the first several years), releases would occur at specific sites to allow monitoring of the impacts of biocontrol on strawberry guava invasions. Results of monitoring will be used to design effective long term management of strawberry guava statewide, integrating biocontrol with mechanical and herbicidal control methods to maximize potential benefits (Sec. 1.1). Releasing only at a single remote site would likely impede monitoring and adaptive management, whereas conducting the initial release at an accessible and easily monitored site will allow better development of effective integrated management of strawberry guava and efficient application of this management statewide.

Existing Control Methods

Aside from biocontrol, there are various means to combat the spread of strawberry guava. Some can be very effective for limited areas, but none are effective on the landscape level. Furthermore, these methods are very expensive and can involve significant environmental damage as side-effects. Each potential method was evaluated.

- Herbicides can be effective for control in limited areas with low density infestations (Tunison and Stone 1992). According to Motooka et al (2003) strawberry guava is “sensitive to foliar, frill and cut-surface applications of triclopyr, dicamba, and 2,4-D, in descending order of efficacy....also sensitive to basal bark applications of 2,4-D, picloram and triclopyr.” For limited areas, Hawai‘i Volcanoes National Park commonly uses a 10% Garlon 3a or 50% triclopyr amine in water with a cut stump method. However, control of strawberry guava using herbicides through aerial or other widespread applications is prohibitively expensive and would also generally be environmentally unacceptable because of water quality and other concerns. Even local applications may have undesirable side effects, such as killing adjacent plants and chemical contamination of the soil or

waterways. Cut-stump treatments can be effective, but they carry the risk of resprouts from slash in wet areas (Tunison 1991). Widespread herbicide applications are also controversial and unpopular. In areas of dense thickets, treating all trees per acre would exceed the allowable application rates for several commonly used herbicides.

- Mechanical control efforts are extremely labor intensive and prohibitively expensive as a general management tool. Strawberry guava plants resprout readily from cut stumps and slash piles. However, plants up to 5 centimeters in diameter can be removed on a limited scale using a weed wrench (Ward 2003). Digging up plants (grubbing) is a suitable control method for many agricultural and residential areas, but dense thickets are extremely time consuming to hand grub and difficult to penetrate even with large machinery. The generally undesirable ecological consequences of large-scale grubbing make it unacceptable in natural areas.
- Cultural techniques such as shading and fire are not likely to be effective to control strawberry guava. It is shade tolerant. No native or alien tree species are known which can grow up through it and shade it out. Controlled burning is not effective. Though aerial portions of the plant are killed by intense fires, the plants rapidly resprout from the basal portion. In ranchlands, there are generally insufficient fuel levels to generate sufficient heat to kill the trees. In natural areas fire is unacceptable as a management tool.

Herbicide and mechanical techniques are being applied in various areas of the Hawaiian Islands, particularly where complete eradication of strawberry guava in limited areas is desired, for example, by farmers on cultivated plots or in parks along trails that are meant to show native forests. The Hawai'i Division of Forestry and Wildlife conducts control activities of strawberry guava along trails using both mechanical and herbicide methods. The Hawai'i Department of Transportation, County Public Works agencies, and utility companies conduct control measures of strawberry guava along roads and utility right-of-ways. The National Park Service and The Nature Conservancy Hawai'i have programs to control strawberry guava in natural areas. At Hawai'i Volcanoes National Park (HVNP), strawberry guava has been targeted for control since 1985 in Special Ecological Areas, selected for intactness of native vegetation, high species diversity, rare flora and manageability (Tunison and Stone 1992). Dramatic reductions in density of strawberry guava and other weeds have been achieved within these limited areas, and the labor to maintain low weed density declines after the initial large investment. However, as densities of strawberry guava increase outside the boundaries of Special Ecological Areas, their vulnerability to invasion and the cost of maintaining them can be expected to increase (Tunison and Stone 1992). A commercial koa operation that proposed to use land in both the State Land Use Agricultural and Conservation districts found that community and environmental groups considered large-scale disruption caused by herbicides and bulldozing unacceptable in the Conservation district (Wade Lee personal communication to Ron Terry, 2007).

Successful herbicide or mechanical treatment can be conducted in areas that are small, adjacent to existing roads, and not highly sensitive for reasons of erosion, water resources, or neighbors. In such areas, the treatments would likely be more successful with the synergy provided by biocontrol. However, these treatments are not effective over large tracts, within areas remote from roads, or in certain environmentally sensitive contexts. For this reason, they could not meet

the purpose of effectively reducing the damaging effects of infestations of strawberry guava over large portions of the native forests of the Hawaiian Islands and do not provide a viable alternative to the proposed action.

Cost is another important consideration. The proposed action is expected to substantially reduce the vigor of strawberry guava over the thousands of acres that are currently invaded, and to reduce the spread of strawberry guava into as much as half the area of the six main islands. Dr. Jonathan Price of the University of Hawai‘i at Hilo, Department of Geography, led a team that conducted an evaluation of the cost of removing strawberry guava through mechanical and herbicide methods under a variety of infestation and distance scenarios. His work is reproduced in Appendix 2 and summarized here.

Labor was estimated a rate of \$200 per worker day, typical of entry-level conservation work. Based on consultation with resource managers experienced in control of forest weeds (including strawberry guava), Price estimated that dense infestations would take about 50 worker-days per acre, and incipient invasions consisting of scattered trees would take about one worker-day per acre.

Control methods include cutting all strawberry guava stems and applying herbicide to prevent resprouting. Control of the numerous seedlings and any subsequent growth would occur during a secondary sweep of each control area. Because only a few areas are easily accessible by road, extra costs associated with work in more remote areas were considered. Away from roads, workers would need to carry equipment through dense vegetation and over rugged terrain. Areas more than about a third of a mile from a road require extra time for work crews to access and therefore a higher cost per acre. Areas more than 1.5 miles away are too remote to work on a day-by-day basis, and would involve work crews camping, usually with helicopter transport for equipment and camping gear. Costs were broken down according to the severity of the infestation and the distance from roads, and maps of these attributes were combined in a Geographic Information System (GIS) in order to determine how much area has a given combination of characteristics (see Maps 1 through 4 in Appendix 2). Table 2 presents the results of the cost estimates, and Figure 5 illustrates cost zones for East Hawai‘i conservation areas.

Table 2
Cost Estimates for Control of Strawberry Guava, East Hawai‘i Conservation Areas

Incipient Invasions
Near roads: 31,600 acres × \$250/acre = \$7,900,000
Moderate Distance: 86,800 acres × \$284/acre = \$24,651,000
Remote: 61,300 acres × \$506/acre = \$31,018,000
Dense Infestations
Near roads: 9,200 acres × \$10,500/acre = \$96,000,000
Moderate Distance: 11,900 acres × \$12,200/acre = \$145,180,000
Remote: 2,700 acres × \$23,315/acre = \$62,950,000
Total Cost: \$367,700,000

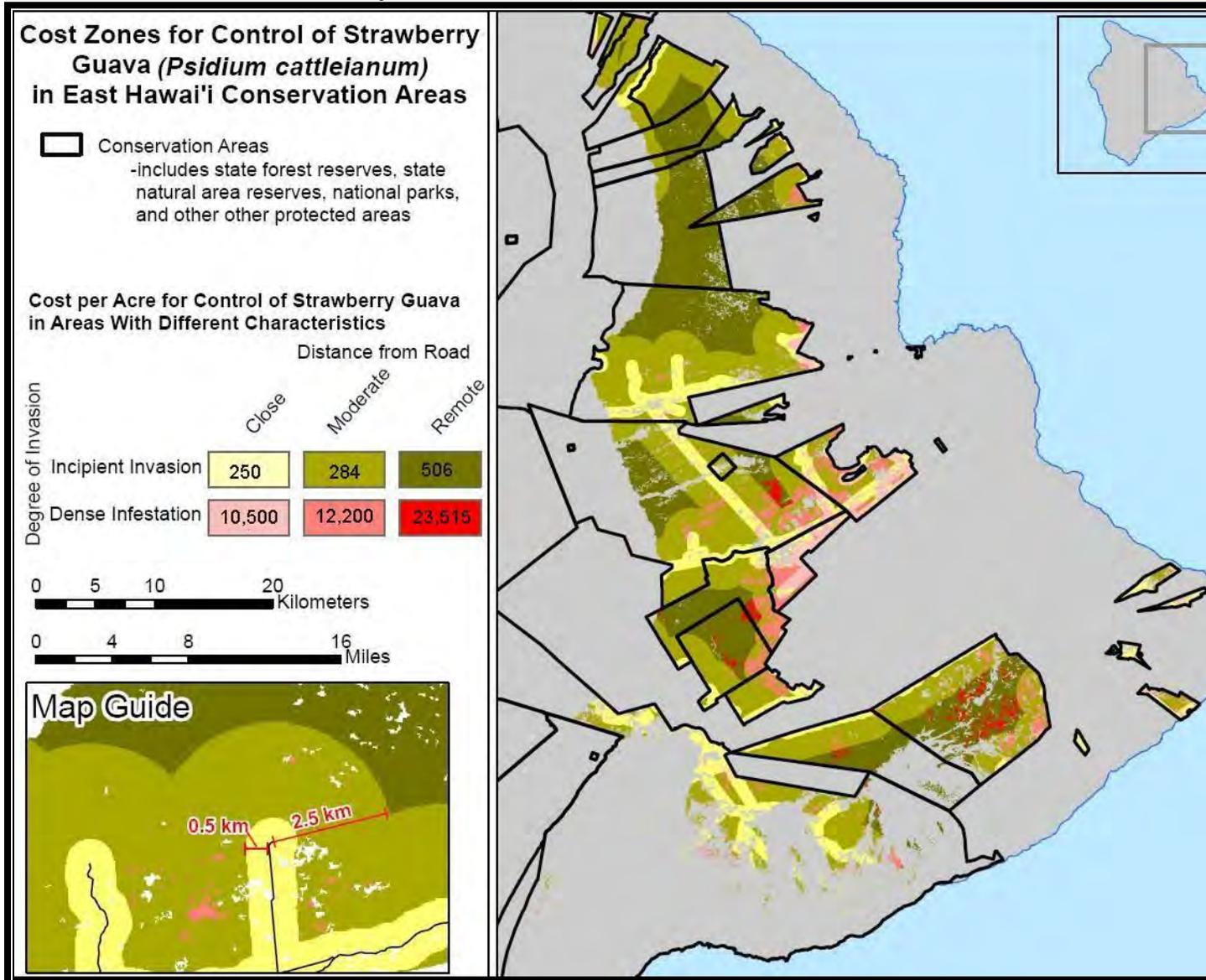
Given the density of the infestation and the difficulty of the terrain in which removal would take place, the total of over a third of a billion dollars appears accurate but far beyond what most would consider the reasonable value of the endeavor. As most of the expense is labor, the effort would also require over 1.5 million labor days; i.e., a full-time job for a year for 6,000 individuals.

In light of the extremely high estimated costs for removal, other approaches or limited scopes were also examined. While removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. Section 3.2 of this EA has a discussion of the potential for strawberry guava to be used as a biomass fuel.

Building additional roads for access was not considered feasible due to added costs and the legal limitations of road construction in areas zoned for conservation or designated as endangered species habitat.

Because strawberry guava produces numerous seeds, a secondary sweep (after perhaps 3-4 years) of each treated area would be necessary to control seedlings. This would likely incur a cost similar to that for incipient invasion across the entire region (estimated at an additional total of about \$70,000,000 for the secondary sweep). Continued dispersal from non-controlled areas may require additional sweeps near the boundaries of controlled areas, adding an unknown cost.

Figure 5
Cost Zones for Strawberry Guava Control, East Hawai'i Conservation Areas



PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Introduction

Unlike many other projects, which may directly affect only a very limited area that can be measured and described systematically, the proposed project treats vast areas of the Hawaiian Islands. The proposed biocontrol of strawberry guava would eventually affect all areas where strawberry guava occurs in the Hawaiian Islands, particularly locations where it occurs in the wild with some abundance. Figures 1a-b above show the general distribution of strawberry guava around the State of Hawai‘i. Note that it does not occur on Kaho‘olawe or Ni‘ihau, but in some locations on all other islands. Although strawberry guava is seen wild in areas with annual rainfall as low as 40 inches and can tolerate the low temperatures found up to roughly 5,000 feet in elevation, it is generally concentrated between sea level and 4,000 feet on the windward sides of islands or at cooler and moister elevations in some leeward areas. Although it is found at sea level in coastal areas, it is not highly salt tolerant and is not part of the shoreline flora.

It is found scattered in nearly pristine native forests, disturbed native forests, and non-native forests, and also invades pasture land and farms. Strawberry guava is not particular as to substrate and it is found in soils of all types, from deep ash to weathered lava to young lava flows. As a result, it is found in many hydrological contexts as well, from areas without streams to highly dissected landscapes, on all types of slopes. Although not classified as a wetland plant, it is reasonably tolerant of short periods of standing water as well.

Many casual observers believe that strawberry guava is confined to hedgerows along roads and does not invade the native forest without some pre-existing human disturbance. In reality, it is a very effective invader and is found deep in roadless areas, as shown in Figures 1b and 1c. Like an iceberg, the visible roadside strawberry guava hedges are only the tip of a very extensive infestation that extends deep into the mauka forests. The mauka-makai Hawaiian land management principles behind the concept of ahupua‘a are applicable here: the uplands, lowlands, and coastal waters are all connected through the hydrological cycle. The role of strawberry guava in this interaction is discussed below in Section 3.3.

The remainder of this chapter is a resource-by-resource discussion of the consequences of the two alternatives described in Section 2 above that are available: the action alternative, for ~~DLNR to issue a permit for release and monitoring of~~ HDOA to release the insect on various lands in the State, including State forest land; and no action (not releasing the insect issuing this permit). Projects may generate three different types of environmental impacts: direct, secondary, and cumulative. Direct impacts are those that obviously result directly from the action itself. Secondary impacts (sometimes called indirect impacts) occur later in time or farther removed in distance or through less direct connections, but are still reasonably foreseeable. Cumulative impacts are defined as the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless

of what agencies or person undertakes such other actions. In this EA, where potential exists for secondary or cumulative impacts, these are discussed along with direct impacts in the resource-based discussion.

3.1 Biological Resources

3.1.1 Direct Impacts on Strawberry Guava

Action Alternative

T. ovatus is expected to affect directly only the target weed strawberry guava in Hawai‘i. *T. ovatus* would cause leaf galls on strawberry guava that reduce the vigor of the plant. The effects may differ from plant to plant and even branch to branch, and will generally be subtle and gradual. This would lead to a 25 to 40 percent reduction in vegetative growth rate and 60 to 90 percent reduction in fruit and seed production, similar to levels seen in its native Brazil (J.H. Pedrosa Macedo and M. Vitorino personal communication to Tracy Johnson, April 2009; J.H. Pedrosa Macedo 2005, unpublished report). High levels of infestation have been observed to cause leaf drop to the point of complete defoliation of strawberry guava in Brazil (Vitorino et al. 2000). This level of damage is relatively rare, however, and may involve combined stresses from other factors such as drought. Both dispersal by seeds and vegetative propagation by clonal sprouts should decline over a period of years where *T. ovatus* becomes established.

Impacts of *T. ovatus* on strawberry guava are expected to occur gradually over a period of decades, providing long-term suppression, allowing natural substitution of strawberry guava by other plant species, and preventing spread of strawberry guava into areas at risk from invasion. Acceleration of this process may be possible over selected areas by combining mechanical or herbicidal control with suppression by *T. ovatus*. Effective biological control of strawberry guava is expected to complement and benefit other weed management programs, for example, increasing the efficacy of mechanical removal of strawberry guava by slowing the weed’s ability to resprout from surviving stems. One key to the expected success of mechanical/chemical control is that strawberry guava exhibits little seed dormancy. The absence of a seed bank means that reduction in fruit production will strongly reduce the plant’s ability to recolonize following control (Uowolo and Denslow 2008). To the extent that *T. ovatus* enhances conventional control of strawberry guava, it may promote additional use of chemical or mechanical methods against this weed over larger areas of land. In these cases it may be appropriate to plan for active restoration of controlled areas, such as by introducing native species. The positive and negative impacts of greater use of chemical or mechanical methods against strawberry guava would depend on the care taken to avoid damage and promote restoration of native ecosystems.

There is some uncertainty associated with the effectiveness of *T. ovatus* for control of strawberry guava. Although observations in Brazil and laboratory tests indicate that this agent can significantly impact individual strawberry guava plants, it may not reduce strawberry guava population growth to desired levels in all areas of Hawai‘i. Worldwide, biological weed control

programs have had an overall success rate of 33 percent; success rates have been considerably higher for programs in some individual countries (Culliney 2005). Actual effectiveness of *T. ovatus* for controlling strawberry guava will not be known until after release occurs and post-release monitoring has been conducted.

Mitigation Measures

The monitoring program will provide information on the rate of dispersal of *T. ovatus* and success of control, focusing on the effects on strawberry guava population growth. The U.S. Forest Service also plans to study the interaction of mechanical control (cutting and stump-herbicide) and biocontrol. The monitoring will provide guidance on future actions, including consideration of methods for dispersing *T. ovatus*, alternate biocontrol agents, and combination methods of treatment for certain areas.

No-Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and efforts to reduce the abundance and range of this species likely would be restricted to chemical and manual methods in limited areas.

3.1.2 Direct and Secondary Impacts on Individual Nontarget Plants and Animals

Action Alternative: Direct Impacts

As discussed in Section 1.3, modern biocontrol requires rigorous testing. Since 1975, over 50 biocontrol species (including natural enemies for clidemia, banana poka, and ivy gourd) have been introduced to Hawai'i without any adverse effects. A biocontrol wasp agent for the wiliwili gall wasp, which has devastated this native tree important for both dry forest ecology and cultural uses, was released in November 2008 and appears to be providing effective suppression of the invader on surviving wiliwili. These examples illustrate how highly host-specific natural biocontrols have become critical tools in efforts to preserve Hawaiian ecosystems.

All laboratory tests and field observations indicate that *T. ovatus* is highly specialized to utilize only strawberry guava and closely related species within the genus *Psidium*, and no other plant species in Hawai'i would be affected by release of *T. ovatus*. These data all suggest a tight evolutionary and ecological link between *T. ovatus* and strawberry guava. Appendix 1 contains extensive information related to the testing of the host-specificity of this biocontrol agent that was conducted in order to obtain the USDA APHIS Plant Protection and Quarantine permits, issued on April 4, 2008.

Historically, host shifts by introduced weed biological control agents to unrelated plants are extremely rare (Pemberton 2000). However, if other plant species were to be attacked by *T. ovatus*, the resulting effects could be environmental impacts that may not be easily reversed, and thus the slight possibility that it could move from the target plant (strawberry guava) to attack

nontarget plants must be considered. Species that are closely related to the target species are the most likely to be attacked. This well-established pattern forms the scientific basis of host specificity testing of proposed biological control agents (Louda et al. 2003). The material below provides an explanation of why it is extremely unlikely that *T. ovatus* would attack nontarget plants.

Strawberry guava and all members of the genus *Psidium* are part of the family Myrtaceae (subfamily Myrtoideae), which has 4,000 species worldwide with an evolutionary history extending across 50 million years (Sytsma et al 2004). The genus *Psidium* includes 50-100 neotropical species (McVaugh 1968). Hawai'i has two well known introduced guavas, strawberry guava (*P. cattleianum*) and common guava (*P. guajava*). Within their genus, these two species appear to be distant relatives. There are no members of the genus *Psidium* that are native to Hawai'i.

The family Myrtaceae is represented in Hawai'i by 49 species in 9 genera. These include seven naturalized, one indigenous, and two endemic species in the subfamily Myrtoideae and 35 naturalized species and five endemic species in the subfamily Leptospermoideae (Wagner et al., 1990). The native species in the same subfamily as strawberry guava (Myrtoideae) are the endangered endemic *Eugenia koolauensis* Degener, the indigenous *E. reinwardtiana* (Blume) DC, and the endemic *Syzygium sandwicensis* (A. Gray) Nied. The dominant tree of native Hawaiian forests, *Metrosideros polymorpha* Gaud., and numerous introduced timber species, including *Eucalyptus* spp., are in the subfamily Leptospermoideae, and are thus more distantly related to strawberry guava.

The Myrtaceae are within the order Myrtales, which also includes the families Sonneratiaceae, Lythraceae, Rhynchocalycaceae, Alzateaceae, Penaeaceae, Crypteroniaceae, Thymelaeaceae, Trapaceae, Punicaceae, Onagraceae, Oliniaceae, Melastomataceae, and Combretaceae (Cronquist 1981). Of this group, only the Lythraceae and Thymelaeaceae include native Hawaiian species: *Lythrum maritimum* Kunth (Lythraceae) is an indigenous shrub, and there are up to 12 endemic species of *Wikstroemia* (Thymelaeaceae) (Wagner et al., 1990). Other families in the Myrtales with representatives naturalized in Hawai'i are the Combretaceae (3 species in 2 genera), Onagraceae (10 species in 4 genera), and Melastomataceae (15 species in 12 genera, including a number of noxious invasive plants).

The tests conducted by the U.S. Forest Service took the above phylogenetic relationships into consideration, testing a broad range of related plants. Laboratory tests of *T. ovatus* host specificity in Brazil demonstrated that it could not develop on common guava, *Campomanesia xanthocarpa*, *Eucalyptus dunii*, *Eugenia uniflora*, or *Metrosideros polymorpha* (Vitorino et al. 2000). Quarantine tests of a broad spectrum of Hawaiian plant species (Appendix 1), including all ecologically prominent Myrtaceae and some uncommon native members of this family, indicate that no species in Hawai'i other than strawberry guava is a suitable host for this insect. Host specificity tests conducted in Florida also support these results (Wessels et al. 2007; Appendix 1). Evidence that *T. ovatus* cannot develop even on *P. guajava* also includes over 15 years of observations of *T. ovatus* populations developing on strawberry guava in close

proximity to *P. guajava* at field sites in Brazil (see Figure 2b). Within Brazilian literature on pests of common guava, *P. guajava*, there is no mention of *T. ovatus* or any gall-forming homopterans (scale insects, aphids and relatives).

There are very few records pertaining to *T. ovatus* and its biology in the literature. In his description of *T. ovatus*, Hempel (1900) noted that it formed galls on leaves of a plant in the Myrtaceae, and was not common. Ferris (1957) illustrated *T. ovatus* from specimens collected from *Psidium*. References to this insect in catalogs of coccoid scales in Brazil also recorded its host as Myrtaceae (Costa Lima 1927; Lepage 1938). With one exception that appears to be an error, existing literature are consistent with an extremely narrow host range for *T. ovatus*, restricted to *P. cattleianum* and sibling species that are not present in Hawai'i. One catalog recorded *T. ovatus* on *Daphnopsis racemosa* Griseb. (in the family Thymelaeaceae) (Hoy 1963); however, this reference is not well supported in other literature. In fact in a previous report Hoy (1962) makes the contradictory statement: "The Myrtaceae are the exclusive hosts for the genera *Apiococcus*, *Apiomorpha*, *Ascelis*, *Carpochloroides*, *Macracanthopyga* and *Tectococcus*." The record in Hoy (1963) appears to refer to a catalog by Costa Lima (1936) in which *T. ovatus* was recorded from "aracazeiro" and "embira." The former is a well-known common name for *P. cattleianum* in southeastern Brazil. "Embira" is more ambiguous. It may refer to *Daphnopsis racemosa* or species of *Anona* or *Rollinia* (in the family Annonaceae). The latter possibility suggests that Costa Lima's reference may be due to confusion between *T. ovatus* and its relative *Pseudotectococcus anonae*. Recent laboratory tests of *T. ovatus* specificity included species of Thymelaeaceae and Annonaceae; results indicated that these are not suitable host plants (Appendix 1).

T. ovatus has few close relatives, which suggests very low likelihood of evolution to use new host plants. There is only the single species, *T. ovatus*, in the genus *Tectococcus* (Hempel, 1900; Hoy, 1963). Hempel (1935) considered its closest relative to be *Pseudotectococcus anonae*, which he described from galls on leaves of a cultivated species of *Anona* (Annonaceae, the custard-apple family) in Vicoso, Minas Gerais, Brazil. Another genus containing only one species described by Hempel (1937), *Neotectococcus lenticularis*, was considered by Ferris (1957) to be possibly in the same genus as *Tectococcus*. This species also formed galls on the leaves of its host plant, which was identified only as a "wild shrub" in Itatinga, Brazil (Hempel, 1937). Although these related insect species use host plants in at least two entirely different families, their genetic relationships have never been studied, which prevents assessment of the genetic distance between them and the possible direction of future evolution.

The extremely close interaction of *T. ovatus* and its host *P. cattleianum*, typical of other gall-forming insects, constrains the insect from feeding on other plant species. A shift to a new host plant would require evolution of new traits, a process that might occur over a long interval of time. The timescale expected for *T. ovatus* to evolve the ability to use a new host plant is difficult to evaluate based on ecological genetics of closely related insect species because its relatives are so few and poorly known. Experience with agents for biocontrol of weeds over the last 100 years indicates that use of nontarget species has been almost entirely predictable

(Pemberton 2000). Evolution of ability to use host plants in new, unpredictable ways has never been documented in over 1,100 cases of weed biocontrol worldwide over the last century. Evolutionary science suggests that, given sufficient time, such as thousands of years or more, novel traits are likely to appear naturally among insects introduced to Hawai‘i (Gillespie and Roderick 2002), biocontrol agents included. Environmental consequences of such evolution would be largely unpredictable and may not be easily reversed. Past patterns of insect evolution in Hawai‘i suggest that, while evolution may result in new species and new associations over a large time scale, it is not a major threat to maintenance of a highly diverse and unique biota. It should be recognized that the time scale of evolution is very long; at such scales, thousands of other species of insects also have an opportunity to evolve new characteristics.

T. ovatus does not feed on or otherwise directly affect any invertebrate or any other animal species.

Action Alternative: Secondary Impacts

Secondary impacts on nontarget species have been documented in a few cases of weed biocontrol, and experience has shown that such effects can be difficult to predict (Coombs et al. 2004). In general however, undesirable secondary impacts have been uncommon, especially for highly host-specific biocontrol agents.

Herbivory of strawberry guava plants is currently negligible; therefore *T. ovatus* is not likely to compete directly with any herbivores already in Hawai‘i. Its major effect on other species is likely to be through reduced fruit production. A variety of non-native species utilize strawberry guava fruit seasonally, and some of these species may be affected to varying degrees. Pigs (*Sus scrofa*), which feed heavily on strawberry guava fruit when it is in season (Diong 1982), may be forced to find other food sources in the short term and may experience reduced population growth in the long term in areas where their dependence on strawberry guava fruit is currently high. The feral pigs that today inhabit much of Hawai‘i’s forests are not the same physically and not used in the same cultural manner as the smaller, domesticated pigs brought to the islands by voyaging Polynesians. Pigs are not native to Hawaiian forests and pig hunting was not a practice in ancient Hawai‘i (Burrows et al 2007). As feral pigs are not natives and are generally recognized to be deleterious to native ecosystems, adverse effects to pig populations may be regarded as environmentally beneficial; however, the issue also deserves consideration in the context of cultural impacts (see Section 3.4) and particularly, socioeconomic impacts (see Section 3.5). Rats, mice, and non-native birds all probably benefit somewhat from current levels of fruit production, although their use of strawberry guava is not well quantified. Any negative impacts on these species would generally be expected to benefit native ecosystems that are negatively affected by these non-natives in a variety of ways (for example, disrupting native plant and animal life cycles, and spreading invasive alien plants). Alien fruit flies, including major agricultural pests such as the oriental fruit fly, can be expected to experience local population declines as a result of biocontrol of strawberry guava (see Section 3.2 below for discussion of fruit flies).

T. ovatus is not expected to be heavily attacked by natural enemies in Hawai‘i because it lies protected inside a gall for most of its life, and there are few related insects in Hawai‘i that appear likely to share its natural enemies. One parasitoid known to attack *T. ovatus* in Brazil, *Metaphycus flavus* (Vitorino et al. 2000), also is recorded from Hawai‘i (Nishida 2002), but it is unknown whether the Hawai‘i biotype of this parasitoid is able to utilize *T. ovatus*. Other specialized enemies of *T. ovatus* are only known in Brazil and are unlikely to travel to Hawai‘i. If these or other natural enemies are able to attack *T. ovatus*, it is possible that populations might build up on *T. ovatus* to a point that they could have significant spill-over effects on other insect hosts or prey species. Impacts mediated through a natural enemy shared with *T. ovatus* most likely would be a risk only to soft-bodied scale insects in the superfamily Coccoidea, which includes native and non-native species (Zimmerman 1948).

Mitigation Measures

Although adverse direct and secondary effects on nontarget plant and animal species and vegetation are theoretically possible, the high specificity of *T. ovatus* for strawberry guava and the fact that it only reduces vigor but does not kill its host plant indicate that adverse direct and secondary effects will not occur. Impacts of *T. ovatus* on nontarget species will be monitored at release sites in native forest plots where density of selected native species will be measured over several years. Releases in experimental plantings of strawberry guava bordered by *P. guajava* will provide demonstrations of specificity of *T. ovatus*. Semiannual reports provided to the Hawai‘i Department of Agriculture Plant Quarantine Branch will record all findings regarding nontarget species. Ongoing landscape-level studies of Hawaiian forests such as those called for in *Hawaii’s Comprehensive Wildlife Conservation Strategy* (Mitchell et al 2005) will also provide data on the effects of this biocontrol, which, as discussed below, are expected to be primarily highly beneficial.

No Action Alternative

Under the Action alternative, the biocontrol agent would not be released on State land, and effects from *T. ovatus* on nontarget species could of course be avoided.

3.1.3 Secondary Impacts on the Forest Ecosystem

Action Alternative

Although few if any adverse direct or secondary impacts to individual nontarget native species are expected, beneficial impacts to the general forest ecosystem are expected to be substantial. Most importantly, biocontrol of strawberry guava will favor native nontarget species by protecting large areas of native forest from being invaded and dominated by strawberry guava.

Because of the lack of natural biocontrol agents in Hawai‘i, the ecology of strawberry guava in Hawai‘i is completely different from that of its native range in Brazil. Furthermore, in a recent

manual on koa silviculture, the authors note that invasive species can actually create forest structures new to Hawaiian ecosystems (Baker et al 2009). In the absence of natural predators or control agents, strawberry guava invades native forests and forms thickets that eventually exclude virtually all other vegetation (see Figures 1c and 3, above).

Dominant species such as 'ohi'a, koa and hapu'u become restricted to scattered aging trees with no regeneration (Baker et al 2009). Subdominant plants become rare, and rare plants disappear entirely. In the words of biologist Jonathan Price:

“A photo taken near Glenwood on the Big Island in 1917 shows an impressive native forest of enormous 'ohi'a trees draped in 'ie'ie vines. Here lived a plant found nowhere else: the giant haha (*Cyanea giffardii*). Today Glenwood is the site of one of the worst infestations of strawberry guava in Hawaii, and the giant haha is extinct” (Honolulu Star-Bulletin, June 14, 2008.).

This unfortunate story of forest ecosystem degradation has been repeated over and over around the Hawaiian Islands in areas invaded by strawberry guava, as discussed in Section 1.3.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active human intervention. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater.

Because the impact of *T. ovatus* on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment. This advantage to gradual control has been demonstrated experimentally with faya tree (*Morella faya*) in Hawaiian rainforests (Loh and Daehler 2007). In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present, so decline of growth and spread of strawberry guava is likely to benefit native species primarily. Thus, patches that would have been colonized and dominated by strawberry guava will probably be filled by native species. In some areas, strawberry guava may tend to be replaced by other invasive species over time. Himalayan raspberry (*Rubus ellipticus*), faya tree, and kahili ginger (*Hedychium gardnerianum*) are examples of weeds that, like strawberry guava, can invade intact forests and form dense patches excluding native plants.

Other invasive species may benefit if sunlight increases within patches of strawberry guava affected by biocontrol. For example, palm grass (*Setaria palmifolia*) and other invasive grasses (*Andropogon virginicus*, *Paspalum conjugatum*) that flourish in large forest gaps with high light levels may increase within stands of strawberry guava that may be partially defoliated by *T. ovatus*. In general, however, a reduction in the vigor and fruiting of strawberry guava, currently a major weed in Hawai‘i, will have a significant benefit in the preservation and restoration of the native elements in native forests.

Mitigation Measures

The monitoring program will include evaluation of vegetation change and effects to threatened and endangered species.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and efforts to reduce the abundance and range of this species would not have this potentially effective tool. Existing chemical and mechanical control methods, because of their expense, are not likely to be used at such a scale to cause extensive damage to nontarget organisms. However, because they are difficult to administer with perfect selectivity, chemical and mechanical techniques will kill some nontarget native plants in areas where they are used. Strawberry guava’s ability to regenerate after these control efforts means that chemical and mechanical control are only temporarily effective and must be repeated, with possible long term cumulative impacts on nontarget species. These environmental consequences may occur even with the implementation of the biological control alternative, depending on the efficacy of *T. ovatus* for reducing strawberry guava populations in Hawai‘i.

3.1.4 Secondary Impacts on Endangered Plant Species

Action Alternative

There are 317 species of plants and animals in the Hawaiian Islands that are federally listed as endangered or threatened. Plant species occurring in mesic and wet forests are most affected by strawberry guava and are most likely to benefit from control of this weed (Table 3).

One endangered plant in the family Myrtaceae occurs in Hawai‘i, *Eugenia koolauensis* (nioi). USDA APHIS has determined that based on the host specificity of *T. ovatus*, there will be no effect on *Eugenia koolauensis*. Several *Eugenia* species, *Eugenia reinwardtiana* (Blume) DC, *E. uniflora* L., *E. axillaris* (Sw.) Willd., *E. foetida* Pers., *E. confusa* DC, and *E. rhombea* Krug & Urban were tested in host specificity tests in Hawai‘i and Florida, but no galls formed on these plants or on any other plant tested besides some closely-related *Psidium* species.

Table 3. Endangered and Threatened Plants Threatened by Strawberry Guava

Species	Common name	Island(s) with critical habitat affected by <i>P. cattleianum</i>	Status
<i>Abutilon sandwicense</i>	-	Oahu	E
<i>Adenophorus periens</i>	Pendant kihi fern	Kauai, Molokai	E
<i>Alectryon macrococcus</i>	Mahoe	Kauai, Maui, Molokai, Oahu	E
<i>Alsinidendron obovatum</i>	-	Oahu	E
<i>Bonamia menziesii</i>	-	Oahu	E
<i>Brighamia insignis</i>	Olulu	Kauai	E
<i>Cenchrus agrimonioides</i>	Kamanomano	Oahu	E
<i>Chamaesyce halemanui</i>	-	Kauai	E
<i>Chamaesyce herbstii</i>	‘Akoko	Oahu	E
<i>Chamaesyce rockii</i>	‘Akoko	Oahu	E
<i>Colubrina oppositifolia</i>	Kauila	Oahu	E
<i>Ctenitis squamigera</i>	Pauoa	Kauai, Lanai, Maui, Oahu	E
<i>Cyanea (=Rollandia) crispa</i>	-	Oahu	E
<i>Cyanea grimesiana</i> ssp. <i>grimesiana</i>	Haha	Oahu	E
<i>Cyanea grimesiana</i> ssp. <i>obatae</i>	Haha	Oahu	E
<i>Cyanea humboldtiana</i>	Haha	Oahu	E
<i>Cyanea koolauensis</i>	Haha	Oahu	E
<i>Cyanea longiflora</i>	Haha	Oahu	E
<i>Cyanea pinnatifida</i>	Haha	Oahu	E
<i>Cyanea remyi</i>	Haha	Kauai	E
<i>Cyanea superba</i>	Haha	Oahu	E
<i>Cyanea truncata</i>	Haha	Oahu	E
<i>Cyanea undulata</i>	Haha	Kauai	E
<i>Cyrtandra dentata</i>	Ha‘iwale	Oahu	E
<i>Cyrtandra limahuliensis</i>	Ha‘iwale	Kauai	T
<i>Cyrtandra munroi</i>	Ha‘iwale	Lanai, Maui	E
<i>Cyrtandra viridiflora</i>	Ha‘iwale	Oahu	E
<i>Delissea subcordata</i>	Oha	Oahu	E
<i>Diellia erecta</i>	Asplenium-leaved diellia	Molokai, Oahu	E
<i>Diellia falcata</i>	-	Oahu	E
<i>Diellia unisora</i>	-	Oahu	E
<i>Dubautia latifolia</i>	Na‘ena‘e	Kauai	E
<i>Dubautia pauciflorula</i>	Na‘ena‘e	Kauai	E
<i>Eragrostis fosbergii</i>	Fosberg's love grass	Oahu	E
<i>Eugenia koolauensis</i>	Nioi	Oahu	E
<i>Euphorbia haeleeleana</i>	‘Akoko	Oahu	E
<i>Flueggea neowawraea</i>	Mehamehame	Oahu	E
<i>Gardenia mannii</i>	Nanu	Oahu	E
<i>Gouania meyenii</i>	-	Kauai, Oahu	E
<i>Gouania vitifolia</i>	-	Oahu	E

Table 3, (Continued)
Threatened and Endangered Plant Species Threatened by Strawberry Guava.

Species	Common name	Island(s) with critical habitat affected by <i>P. cattleianum</i>	Status
<i>Hedyotis degeneri</i>	-	Oahu	E
<i>Hedyotis mannii</i>	Pilo	Lanai	E
<i>Hedyotis schlechtendahlia</i> var. <i>remyi</i>	Kopa	Lanai	E
<i>Hesperomannia arborescens</i>	-	Oahu	E
<i>Hesperomannia arbuscula</i>	-	Oahu	E
<i>Hibiscus clayi</i>	Clay's Hibiscus	Kauai	E
<i>Isodendrion laurifolium</i>	Aupaka	Oahu	E
<i>Isodendrion longifolium</i>	Aupaka	Oahu	T
<i>Labordia cyrtandrae</i>	Kamakahala	Oahu	E
<i>Lipochaeta tenuifolia</i>	Nehe	Oahu	E
<i>Lycopodium (=Phlegmariurus) nutans</i>	Wawae'i ole	Kauai, Oahu	E
<i>Melicope balloui</i>	Alani	Maui	E
<i>Melicope munroi</i>	Alani	Lanai	E
<i>Melicope ovalis</i>	Alani	Maui	E
<i>Melicope pallida</i>	Alani	Oahu	E
<i>Melicope saint-johnii</i>	Alani	Oahu	E
<i>Myrsine juddii</i>	Kolea	Oahu	E
<i>Myrsine linearifolia</i>	Kolea	Kauai	T
<i>Neraudia angulata</i>	-	Oahu	E
<i>Nototrichium humile</i>	Kulu'i	Oahu	E
<i>Phyllostegia hirsuta</i>	-	Oahu	E
<i>Phyllostegia kaalaensis</i>	-	Oahu	E
<i>Phyllostegia mollis</i>	-	Oahu	E
<i>Phyllostegia parviflora</i>	-	Oahu	E
<i>Pritchardia viscosa</i>	Lo'ulu	Kauai	E
<i>Pteralyxia kauaiensis</i>	Kaulu	Kauai	E
<i>Pteris lidgatei</i>	-	Oahu	E
<i>Schiedea hookeri</i>	-	Oahu	E
<i>Schiedea kaalae</i>	-	Oahu	E
<i>Schiedea membranacea</i>	-	Kauai	E
<i>Schiedea nuttallii</i>	-	Oahu	E
<i>Solanum sandwicense</i>	'Aiakeakua, popolo	Kauai, Oahu	E
<i>Stenogyne kanehoana</i>	-	Oahu	E
<i>Tetraplasandra gymnocarpa</i>	'Ohe'ohe	Oahu	E
<i>Urera kaalae</i>	Opuhe	Oahu	E
<i>Viola helenae</i>	-	Kauai	E
<i>Viola oahuensis</i>	-	Oahu	E

Federally listed endangered (E) and threatened (T) plant species for which strawberry guava (*Psidium cattleianum*) has been noted by USFWS as a threat in critical habitat areas on the islands of Kauai, Oahu, Maui, Molokai and Lanai (USFWS 2003a-d).

Federal and State endangered species laws require government agencies to ensure that their actions are not likely to jeopardize the continued existence of federal or State listed threatened endangered species or result in the destruction or adverse modification of federal critical habitat. Although through its improvement of native forests the action has obvious and substantial benefits to all native plant species, particularly those that are rare, threatened or endangered, the U.S. Forest Service has carefully tested *T. ovatus* to ensure that it would not inadvertently attack non-target natives, as discussed above.

Mitigation Measures

As no adverse impacts to endangered plant species have been identified, no mitigation measures are necessary.

No-Action Alternative

Under the No-Action Alternative, no biocontrol of strawberry guava would be attempted on State land, and biocontrol of strawberry guava may not be available as a tool to protect and promote populations of threatened and endangered plant species.

3.1.5 Secondary Impacts on Endangered Animal Species

Action Alternative

A large number of threatened and endangered birds, invertebrates including insects and snails, and a single mammal, the Hawaiian hoary bat, depend upon the health of the native Hawaiian forest for their sustenance and survival (Table 4). Strawberry guava thickets provide little to no habitat for Hawai'i's remaining native birds. In areas of lower Puna where both strawberry guava and 'ohi'a co-occur, the native 'Amakihi (*Hemignathus virens*) and 'Apapane (*Himatione sanguinea*) were found to roost and forage almost exclusively in the native forest, while effectively ignoring the guava (Sugishita 2008). In addition, the federally funded Hawai'i Forest Bird Survey noted a consistent lack of native birds in strawberry guava forests (Scott et al 1986). Dominance by strawberry guava disrupts the close, million-year old relationships between native trees and native birds. Birds such as 'Amakihi, 'Apapane, and 'Omao (*Myadestes obscurus*) provide pollination and seed dispersal services for native plants. In turn, plants such as olapa, pilo, akala, kopiko, 'ie'ie, *Clermontia*, and kolea provide nectar and fruit resources for native birds (Perkins 1903; Patrick Hart personal communication to Ron Terry, 2009).

As discussed in Section 1.3, some biologists feel the threat posed by strawberry guava to the Hawaiian Petrel (*Pterodroma phaeopygia sandwichensis*) habitat in Lana'i is so extreme that it may become extinct there. This bird nests in uluhe on steep hillsides but strawberry guava is successfully colonizing and its roots are so dense that the petrels can no longer dig their burrows between them.

Table 4. Threatened/Endangered Animal Species in Strawberry Guava Threatened Forests

Species Name	Common Name	Status
<i>Achatinella spp.</i>	Snails, O‘ahu Tree	E
<i>Buteo solitarius</i>	Hawk, Hawaiian	E
<i>Chasiempis sandwichensis ibidus</i>	Elepaio, O‘ahu	E
<i>Corvus hawaiiensis</i>	Crow, Hawaiian	E
<i>Drosophila heteroneura</i>	Picture-wing fly	E
<i>Erinna newcombi</i>	Snail, Newcomb’s	T
<i>Hemignathus lucidus</i>	Nukupu‘u	E
<i>Hemignathus munroi</i>	Akiapola‘au	E
<i>Hemignathus procerus</i>	Akialoa, Kaua‘i	E
<i>Lasiurus cinereus semotus</i>	Bat, Hawaiian Hoary	E
<i>Loxops coccineus coccineus</i>	Akepa, Hawai‘i	E
<i>Loxops coccineus ochraceus</i>	Akepa, Maui	E
<i>Melamprosops phaeosoma</i>	Po‘ouli	E
<i>Moho braccatus</i>	‘O‘o, Kauai	E
<i>Myadestes lanaiensis rutha</i>	Thrush, Molokai	E
<i>Myadestes myadestinus</i>	Thrush, Large Kaua‘i	E
<i>Myadestes palmeri</i>	Thrush, Small Kaua‘i	E
<i>Oreomystis mana</i>	Creeper, Hawai‘i	E
<i>Palmeria dolei</i>	Honeycreeper, Crested	E
<i>Paroreomyza flammea</i>	Creeper, Moloka‘i	E
<i>Paroreomyza maculata</i>	Creeper, O‘ahu	E
<i>Pterodroma phaeopygia sandwichensis</i>	Petrel, Hawaiian Dark-rumped	E
<i>Pseudonestor xanthophrys</i>	Parrotbill, Maui	E
<i>Psittirostra psittacea</i>	‘O‘u	E

Notes: E= Endangered; T= Threatened; List is partial. Source: USFWS 2009;
<http://www.endangeredspecies.com/states/hi.htm>

Comments in response to the original Draft EA for the action included concerns by residents that because Hawaiian hoary bats feed on insects, reducing strawberry guava might also reduce insect populations that are associated with it, harming the bat. According to Hawaiian hoary bat expert Frank J. Bonaccorso, Ph.D. (personal communication to Tracy Johnson, 2009), the non-native fruit flies and mosquitoes associated with strawberry guava are not prey for Hawaiian hoary bats, which forage on insects that are at least one centimeter in size, such as beetles and termites. Furthermore, these bats would not use strawberry guava thickets as habitat, as they do not enter closed, cluttered forest where they cannot fly. It is likely that a reduction in strawberry guava thickets would benefit this bat, as it would other native species.

Native snails eat the fungus off ‘ohi‘a leaves. Any action that helps maintain a healthy ‘ohi‘a forest would likely be beneficial to native snails, including endangered species (Lisa Hadway personal communication to Frances Kinslow, 2009). Native snails are sometimes found on common guava and strawberry guava trees, but these plants are not essential to snail conservation (Robert Cowie personal communication to Tracy Johnson, 2009). According to biologist Daniel Chung, formerly with The Nature Conservancy and Bishop Museum, strawberry guava leaf litter makes very poor habitat for the native terrestrial snail species. The spread of guava is associated with a decline

or disappearance of native terrestrial snails (Conservation Council 2009). Despite the overall benefit to snail habitat, it is not certain what would occur with individual snails or snail populations that currently are found on strawberry guava plants if the number of these plants is reduced.

In sum, no adverse impacts upon threatened or endangered animal species are foreseen from introducing a natural biocontrol agent that can reduce the vigor and spread of the invasive strawberry guava. The expected increase in forest health, including increased populations of rare, threatened or endangered species that have unique relationships with threatened or endangered birds and invertebrates, would provide a substantial benefit to all of these species, and may even prove critical for survival for some of them.

Mitigation Measures

As no adverse impacts to endangered animal species have been identified, no mitigation measures are necessary.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and biocontrol of strawberry guava would not be available as a tool to protect and restore native forests on State lands that provide habitat for threatened and endangered plant species.

3.1.6 Biological Impacts to Locations Outside of Hawai‘i

Action Alternative

Although it is under study in Florida as a potential biocontrol agent for a widespread strawberry guava invasion, there is concern in Florida about potential impacts of *T. ovatus* on native species of *Psidium*. More tests of specificity are required. Similar concerns might exist regarding species in the Caribbean. Considering the much closer distance and the far greater contact between Brazil (where *T. ovatus* is widespread) and Florida as compared to Hawai‘i and Florida, the likelihood of Hawai‘i acting as a source for an infestation of *T. ovatus* appears remote.

Mitigation Measures

Unauthorized or accidental transport of the insect to the U.S. mainland will be mitigated by the existing strict quarantine procedures for the export of fruit and plant products.

No Action Alternative

Under the no action alternative, risk of introducing *T. ovatus* from Hawai‘i to Florida or areas outside of the U.S. could be avoided.

3.1.7 Cumulative Biological Impacts

Action Alternative

Past and present actions in Hawai'i to control strawberry guava include mechanical and chemical controls applied by a variety of State and federal agencies as well as private organizations and individuals. The Hawai'i Division of Forestry and Wildlife conducts control activities of strawberry guava along trails using mechanical and chemical methods. The Hawai'i Department of Transportation and utility companies conduct control measures of strawberry guava along roads and utility right-of-ways. The National Park Service and The Nature Conservancy Hawai'i have programs to control strawberry guava in natural areas. At Hawai'i Volcanoes National Park (HVNP), strawberry guava has been targeted for control since 1985 in Special Ecological Areas, selected for intactness of native vegetation, high species diversity, rare flora and manageability (Tunison and Stone 1992). Dramatic reductions in density of strawberry guava and other weeds have been achieved within these limited areas, and the labor to maintain low weed density declines after the initial large investment. However, as densities of strawberry guava increase outside the boundaries of Special Ecological Areas, their vulnerability to invasion and the cost of maintaining them can be expected to increase (Tunison and Stone 1992).

Impact of release of *T. ovatus* on the target weed is expected to advance gradually in time and area, providing long-term suppression of strawberry guava, allowing natural substitution of strawberry guava by other plant species, and preventing spread of strawberry guava into areas at risk from invasion. Acceleration of this process may be possible over selected areas by combining mechanical or herbicidal control with suppression by *T. ovatus*. Effective biological control of strawberry guava is expected to complement and benefit other weed management programs, for example, increasing the efficacy of mechanical removal of strawberry guava by slowing the weed's ability to resprout from surviving stems. To the extent that *T. ovatus* enhances conventional control of strawberry guava, land managers may find it environmentally and financially beneficial to use chemical or mechanical methods against this weed over larger areas of land. In these cases it may be appropriate to plan for active restoration of controlled areas, such as by introducing native species. The impacts of greater use of chemical or mechanical methods against strawberry guava would depend on the care taken to avoid damage and promote restoration of native ecosystems.

Mitigation Measures

As part of monitoring efforts, the U.S. Forest Service has a funded proposal to investigate the effectiveness of the interaction of biocontrol with other control methods. The U.S. Forest Service will make the results of this monitoring available to agencies, landowners and others in the interested public to promote responsible control methods.

No-Action Alternative

Under the no action alternative, the impacts of strawberry guava on native species would tend to accumulate with past and present invasive weed impacts and other factors that have degraded native forests over time. The long term cumulative impacts of failing to manage strawberry guava using biological control are expected by many scientists, land managers and environmental organizations to be highly adverse to biological resources in the State of Hawai‘i.

3.2 Agricultural and Economic Impacts

3.2.1 Commercial Use of Strawberry Guava, Wood and Plants

Action Alternative

Strawberry guava has modest commercial value. The fruit may be collected and eaten or made into juice and other products (Morton 1987). Farmers markets in Hawai‘i feature a wide variety of fruits and jams, but strawberry guava is almost never among them. Fruit flies are a very heavy pest on strawberry guava, which also spoil quickly after picking. A 2004 project in Kona, funded through the University of Hawai‘i Manoa College of Tropical Agriculture and Human Resources (CTAHR) and called “Twelve Fruits”, explored new fruits for potential commercial production in Hawai‘i. The study team attempted to determine if strawberry guava fruit could be a valuable commercial fruit crop. The group found that the fruits could be sold successfully at local markets, but the production was labor intensive and thus not economically viable. All fruits had to be bagged as they were growing to prevent infestation by fruit flies and damage by birds, and trees had to be pruned to a height conducive to bagging and picking. The effort was abandoned due to the noted invasiveness of the tree (Love et al 2007). At least one company on Maui produces small amounts (about 30 pints per year) of strawberry guava jelly using the fruits of just one tree (Frances Kinslow personal communication to Ron Terry, 2009).

Although the wood is used by some on a household level, as discussed in Section 3.5 below, for firewood for smoking meat, no commercial firewood or charcoal operation utilizing strawberry guava wood is known. Some craft implements and tools fashioned from strawberry guava are also sold commercially at stores and craft fairs. One local retailer in Hilo offers a makeshift fish-scaler made of strawberry guava wood and bottle caps. The plant is sometimes featured in gardens for its smooth multicolored bark contrasting with shiny, dark green leaves and toleration of pruning and shaping. However, the fruits are messy and attract insects, so planting next to sidewalks and driveways is discouraged. Potted plants and seed are sold by some horticulturists in Hawai‘i, although this market is probably limited by the ubiquity of wild plants. Like other *Psidium* species, strawberry guava has leaves containing compounds with biological activity including antimicrobial properties (Cochrane 1999, Delgado-Vargas et al 2006), but these have not been developed commercially.

No substantial impact on the above-listed commercial uses of strawberry guava fruit, wood, or plants is expected. As discussed in previous sections, *T. ovatus* would not kill strawberry guava

plants or taint their fruit. It slows fruit production and spread. The action will impact stands of guava gradually, allowing more native species to grow back and helping native forests to regenerate. People will still be able to pick fruit (even if will not be as abundant) and gather the wood, as Brazilians continue to do in their forests where the trees are preyed upon by a far greater multitude of insects. Furthermore, because this biocontrol agent has been thoroughly tested and found to be very specific to strawberry guava, it is highly unlikely that effects to any other plant product that might cause economic impacts would occur.

Mitigation Measures

For those who currently or in the future may wish to produce strawberry guava jellies or jams, the infestation of *T. ovatus* can be controlled by application of appropriate insecticides, which will reduce leaf galls. For example, the insect is susceptible to horticultural oil sprays, which are relatively innocuous to the environment and are compatible with production of fruit for consumption (Cranshaw and Day 1994). Neem oil and garlic oil, which can repel insects, inhibit their feeding, deter them from laying eggs, or retard their growth, are two natural botanical pesticides that are the least toxic to humans of various botanical pesticides such as citrus oils, mint oil, pine oil and herbal extracts.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and impacts to the minor commercial uses of the fruit of this plant could be avoided

3.2.2 Commercial Use of Native Forest Products

Action Alternative

Strawberry guava has a great impact on the viability of forestry operations using native trees. The native tree koa provides an attractive and extremely valuable hardwood used primarily in furniture, cabinets, crafts, and artwork. Silviculture of koa helps reduce the pressure on wild koa. Strawberry guava has been recognized as an impediment to sustainable wild koa harvests because many areas disturbed by logging are colonized by strawberry guava more quickly than by koa (Dobbyn 2003). It may completely limit koa to the overstory and prevent its regeneration (Baker et al. 2009). It is also a pest for commercial silviculture of koa, because it is difficult to remove from old agricultural land and is a pest in new plantings (Wade Lee personal communication to Ron Terry 2005). Unpublished data by Julie Denslow of the U.S. Forest Service indicates that site preparation costs can increase from \$200-\$300/acre for grass dominated acreage to \$2,000/acre for acreage dominated by strawberry guava.

Mitigation Measures

No adverse impacts to the use of native forest products are anticipated from the proposed action and no mitigation measures are warranted.

No Action Alternative

Under the no action alternative, without the use of biocontrol of strawberry guava as a management tool on State lands, the continuing impact on koa operations would continue unabated.

3.2.3 Agricultural Damage Due to Fruit Flies

Action Alternative

Strawberry guava in Hawai‘i serves as a critical wild host of economically important fruit flies, including oriental fruit fly (*Bactrocera dorsalis*) and Mediterranean fruit fly (medfly, *Ceratitidis capitata*) (Vargas et al. 1983a&b, Vargas and Nishida 1989, Vargas et al. 1990, Harris et al 1993). Pest populations developing in fruit from wild hosts, especially strawberry guava and *P. guajava*, overflow into dozens of fruit and vegetable crops. Economic costs associated with strawberry guava infestations in Hawai‘i are not well quantified, but appear to be substantial, as fruit flies are a major impediment to the production of soft fruits in Hawai‘i. For papaya alone, McGregor (2004) estimated that fruit flies cost growers \$7.8 million per year due to reduced fruit quality and production, post production treatment for flies, and reduced export markets. Moreover McGregor (2004) estimated that fruit flies cost Hawai‘i \$78 million in opportunity costs because fruit flies precluded the development of new production of soft-fruited crops. How much of that loss is attributable to strawberry guava is difficult to quantify, but Roger Vargas (USDA ARS PBARC) estimates that 95 percent of fruit fly populations can originate from wild common or strawberry guava stands. In windward wet climates, strawberry guava is the predominant host, providing breeding grounds for high populations of fruit flies that can attack orchard fruits up to five miles away.

The ubiquity of fruit flies also limits possibilities for export of Hawaiian produce to major markets such as California and Japan. Concern over accidental introduction of Hawai‘i’s fruit flies into the U.S. mainland costs millions of dollars annually in quarantine and eradication efforts (Kaplan 2004). A USDA-ARS area-wide pest management program has recently undertaken the task of integrating a variety of control tactics over large areas in Hawai‘i (Kaplan 2004). However, attempts at management of fruit fly pests are severely constrained by the abundance of fruiting strawberry guava (Vargas and Nishida 1989, Vargas et al. 1990, Vargas et al. 1995). Although biocontrol of strawberry guava is just a part of controlling fruit fly operations, the reduction of fruiting would provide a substantial benefit.

Mitigation Measures

The reduction in fruiting of strawberry guava that would result from the proposed action is in itself a substantial mitigation for damage to agriculture from fruit flies, and no mitigation measures are warranted.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and efforts to reduce the abundance and range of this species would be likely restricted to chemical and manual methods in limited areas, raising economic costs to agriculture related to fruit flies. In the absence of biological control of strawberry guava, the weed can be expected to increase in density in many agricultural areas and the magnitude of problems with pest fruit flies may increase.

3.2.4 Biomass Potential of Strawberry Guava

Action Alternative

It has also been suggested by some that stands of strawberry guava provide a potential untapped source of biomass energy whose integrity needs to be preserved as a sustainable resource for Hawai'i. Chris Buddenhagen, former Coordinator of the Hawai'i Invasive Species Council, and Scott Turn, of the Hawai'i Natural Energy Institute, explored the potential for this use (personal communication to Anne Marie La Rosa, 2009). As a typical 25 megawatt biomass plant (some of which are in planning on various islands) could utilize up to 190,000 tons of dry strawberry guava per year, if economically feasible, requiring perhaps 7,000 acres of high density guava, the idea merited economic evaluation.

The calculations begin by assuming best case stocking densities of about 60,000 pounds per acre, found by Dr. Flint Hughes at the heavily infested Keauohana Forest Reserve on the Big Island. The energy value of guava was measured by Turn et al (2005) at 8,240 British Thermal Units (BTU) per pound. Out of various woods tested from Hawai'i, including four species of eucalyptus, moluccan albizia, tropical ash, and ironwood, strawberry guava's 8,240 BTU is close to the mean of 8,202 BTU (standard deviation 306 BTU) (Ibid).

Further assuming a high value of oil at \$116 per barrel, the raw biomass value of strawberry guava wood on a per-acre basis would be approximately \$9,850 (lower density stands would yield lower returns). This raw value, however, needs to be adjusted for the cost of harvesting, chipping and drying, and transporting. Unfortunately, harvest costs are very high even for stands of guava with adequate access. For conservation areas that are not immediately adjacent to roads, labor costs for harvest alone would be expected to exceed \$10,000 per acre (see Section 2.3 above). Thus, even with high oil values, the biomass value of stands of strawberry guava would likely be net negative.

Many other species of trees would have higher value for biomass to energy conversion, which is one reason that no plant operator to date has proposed utilizing the abundant existing resources of strawberry guava for this purpose, preferring instead to propose fast-growing, high-BTU trees such as eucalyptus or tropical ash. For plantations, shrubs such as *Jatropha* spp. and grasses such as switchgrass and Guinea grass (*Panicum* spp.) are also far more attractive. Communication with companies proposing the use of biomass in Hawai'i indicate that even if

strawberry guava had appropriate energy characteristics, the fact that it is often located on steep slopes or away from roads disqualifies it from any serious consideration (Rory Flynn and John Ray, personal communication to Frances Kinslow and Ron Terry, 2009). Biomass operators look for crops that can be large in scale and rotational, with high cellulose content, proven performance, and ease of harvesting. Strawberry guava thickets do not offer these characteristics.

It should be noted that even after introduction of *T. ovatus*, huge stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. However, as discussed in Section 2.3, biomass harvesting as a control method for conservation is untenable. Natural area managers are most interested in managing low density outlier populations and invasion fronts in the most pristine areas, distant from roads, within a matrix of predominantly native and endemic species. While removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. Conservation work here would not combine well with a biofuels harvesting program.

Mitigation Measures

The proposed action would have almost no effect on the total biomass of existing stands of strawberry guava. The ability to harvest them for biomass, if desired, would not be affected. As there are any number of trees, shrubs and grasses with better biomass potential and little or no invasive species impacts, the future reduction of vigor in strawberry guava should not be considered an adverse impact to the biomass industry.

No Action Alternative

The no action alternative would likely increase future stocks of strawberry guava for use as a potential biomass feedstock, although there does not appear to be any substantial potential for this species as a feedstock with a positive net economic outcome.

3.2.5 Other Economic Issues

Action Alternative

The rapid growth of strawberry guava infestations also raises costs for vegetation management near roads, powerlines, homes, institutional buildings and businesses. Boundary and topographic surveyors are easily able to traverse most types of native forest but must cut strawberry guava with machetes, yielding sharp “punji sticks” that are a hazard until they have completely resprouted. Current costs of strawberry guava control in parks, watersheds and in road/utility corridors using herbicidal and mechanical methods are not well quantified but are likely to be considerable. The plant’s ability to resprout from cut or downed stems makes repeated control

efforts necessary. Biocontrol that could slow the spread and growth of strawberry guava would likely yield substantial savings to these activities.

It was suggested in some comments during the original EA process that impacts to the value of private properties could be substantial if the biocontrol agent caused massive strawberry guava dieback or defoliation, inducing scenic impacts and loss of food and wood. As illustrated in Figure 2 and discussed below in Section 3.6 in the context of scenic impacts, the leaf galls on strawberry guava are effective at limiting growth and fruiting but are only visible from close-up, leaving a still attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of *T. ovatus* on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit fly pests, which gardeners and farmers may value. In any case, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. For example, the construction of new highways that serve the State's motorists invariably bring increases in noise, impacts to scenic vistas, and minor increases in air pollution. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

Another area of economic concern is ecosystem services and ecotourism values provided by conservation lands, some of which are severely reduced by the impacts of strawberry guava. High densities of strawberry guava suppress regeneration of native species, alter the structure of the forest, increase evapotranspiration loss of water from the watershed (see Section 3.2, below), and reduce habitat for native birds and insects. Strawberry guava thickets reduce access of hikers and hunters to the forest and increase costs of trail maintenance. Abundant reproduction of strawberry guava from sprouts and seeds following control operations creates a perpetual need for intervention in subsequent years to maintain low population levels. The principal entities charged with the care of conservation lands in the State, such as DLNR, the National Park Service, the U.S. Fish and Wildlife Service, The Nature Conservancy, and Kamehameha Schools, lack the resources for long-term management of strawberry guava. Conservation land managers must practice a form of triage, abandoning some lands to the takeover of strawberry guava and restricting investments in weed control to a small percentage of the area designated for biodiversity conservation. The presence and abundance of strawberry guava on conservation lands reduces the likelihood that land is set aside for conservation purposes and may result in a *de facto* abandonment of declared conservation areas from further management. Costs of mechanical and chemical control of strawberry guava are highly variable, depending on the density of the infestation, accessibility of the site and rates of regrowth, as discussed in Section

2.3, above. Although it is difficult to estimate total economic losses from strawberry guava, they are likely substantial.

Mitigation Measures

The reduction in fruiting and vigor of strawberry guava that would result from the proposed action would substantially benefit vegetation management efforts and increase the ecotourism value and the value of ecosystem services provided by the native forests. It is difficult to definitively conclude that this reduction, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit fly pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and efforts to reduce the abundance and range of this species would be likely restricted to chemical and manual methods in limited areas, likely raising economic costs to vegetation management. As strawberry guava control over the vast majority of conservation areas by other means is infeasible, the loss to ecosystem services from continuing strawberry guava invasion is essentially inevitable. Under the no action alternative, impacts on the potential value of strawberry guava on private property could be avoided.

3.3 Soil Erosion, Watersheds, Public Health and Wildfire

Action Alternative

The forests of Hawai‘i are important zones of water input that can be adversely affected by factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology (Giambelluca et al 2008). Forests of eucalyptus on Maui, loblolly pine at Koke‘e on Kaua‘i, miconia on the Big Island, and strawberry guava statewide exhibit similar structural characteristics: a dense uniform canopy with very little understory. In native Hawaiian forests, the impact of raindrops is buffered by leaves of upper canopy trees such as ‘ohi‘a and koa, and then again by leaves of subcanopy trees such as mehame, kopiko, hapu‘u and kolea and again by epiphytes, ground ferns, mosses, and layers of decomposing branches and leaves. The forests also help block winds and retard evaporation (Science Daily, July 21, 2008).

Recent measurements in two tropical montane cloud forests in Hawai‘i indicate that invasion by strawberry guava reduces ground water recharge because of very high evapotranspiration rates (Giambelluca et al 2008). Compared with forest dominated by native ‘ohi‘a (*Metrosideros polymorpha*), a site heavily invaded by strawberry guava exhibited 27 percent higher evapotranspiration, with the difference rising to 53 percent during dry-canopy periods. Much of the difference may be due to the dense stand structure and high foliage biomass of strawberry guava invaded stands, suggesting that for many decades to come these forests will be diverting water that would otherwise recharge aquifers and streams. Expansion of dense stands of strawberry guava across island watersheds will result in further reductions of water to island water supplies.

Some comments on the biocontrol project expressed concern for increased risk of rockfall along roads and highways where strawberry guava helps hold the soil and rock, e.g., Hana Highway on Maui, and the Pali Highway on O‘ahu. If strawberry guava were removed suddenly and extensively from steep, wet areas without being replaced by other species, accelerated mass wasting, including rockfalls and landslides, could ensue. However, the impact of weed biocontrol agents on their target is not severe or rapid enough to promote such a sequence of events (Schooler et al. 2004). In the case of strawberry guava this scenario is particularly unlikely because *T. ovatus* has never been observed to kill even small potted plants under extremely high infestation levels. Even if trees were killed, the process would likely be so gradual that strawberry guava roots would continue to hold soil long until replaced by other plants.

At least one resident in public meetings expressed concerns that strawberry guava might be replaced with species that are more fire prone. The degree to which somewhat more fire-prone vegetation would be promoted by the proposed action is unknown, although ecologists consulted as part of the EA did not identify fire as a particular threat. As discussed in Section 3.1, there is a possibility that, within the rainforest, other invasive species such as palm grass or broomsedge may benefit from increased light availability within declining patches of strawberry guava. Although fires are very uncommon in the wet forests where strawberry guava is common, increases in grass density could conceivably lead to increased risk of wildfires during occasional droughts. The largest wildfires in Puna the last 30 years have been concentrated in the land makai of Highway 130 between Hawaiian Paradise Park and Hawaiian Beaches, where alien grasses have taken hold and ‘ohi‘a forest is largely gone. Wildfires are recognized as highly detrimental to Hawaiian ecosystems, because they eliminate native species and perpetuate systems dominated by fire-adapted alien grasses (Smith and Tunison 1992). Actions that help promote the health of the ‘ohi‘a forest, such as decreasing the amount of strawberry guava, are likely to help combat fire as well.

Mitigation Measures

The monitoring plan will include examination of vegetation change in various environments that can provide data on changing fuel loads and fire-prone vegetation, and suggest mitigation measures if warranted, to the question of whether the replacement vegetation might be more prone to fire.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land. Chemical and manual methods would likely not be effective on the landscape level on State land and would lead to continued lower recharge, and possibly greater sedimentation and even disease concerns. Strawberry guava often completely alters the ecology of the forest, becoming so dominant that it excludes all native trees. It is not known to what extent strawberry guava forests promote an increase in pigs, but pigs are often present. Their rooting activities, trampling and compaction and elimination can lead to increases in runoff, sedimentation and pathogens in the water. If pigs do increase as a result of strawberry guavas, a number of environmental impacts ensue. People using the forest or drinking or bathing in water downstream from the infestation area may be affected by serious zoonotic diseases (diseases that can pass between people and animals (Stephen Hess personal communication to Ron Terry, February 2009).

3.4 Cultural Resources

Rechtman Consulting, a Big Island-based cultural resources management firm, prepared a Cultural Impact Assessment (CIA) for the proposed action, with the assistance of the chief scientist for this EA and Frances Kinslow, B.A., of the U.S. Forest Service. The CIA is contained in full in Appendix 3 and summarized here. This study has been prepared pursuant to Act 50, approved by the Governor on April 26, 2000; in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawai‘i, on November 19, 1997; and in consideration of federal and state guidelines, among which are the Advisory Council on Historic Preservation’s “Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review” (ACHP 1985); National Register Bulletin 38, “Guidelines for Evaluating and Documenting Traditional Cultural Properties”; the Hawai‘i State Historic Preservation Statute (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of on-going cultural significance; and the criteria, standards, and guidelines currently utilized by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) for the evaluation and documentation of cultural sites (cf. 13§13-275-8; 276-5).

Location

Unlike most CIAs, in which the typical project analyzed directly affects only a very limited area that can be systematically measured and described, the proposed biocontrol of strawberry guava would eventually affect all areas where strawberry guava occurs in the Hawaiian Islands, and in particular, locations where it occurs in the wild with some abundance (see Figure 1a).

Strawberry Guava Background

Strawberry guava was introduced to Hawai‘i in 1825 for use as an ornamental landscaping plant. As early as 1832, nurseries were selling strawberry guava seeds and trees in Hawai‘i for this purpose. There is no doubt that during the nineteenth century humans and animals alike

consumed the fruit as well. As with common guava, strawberry guava was eaten raw and used for jams and jellies. Anthropologists studying Hawaiian household customs in the early twentieth century include “guava” among examples of food found in a typical household (MacCaughy 1917, Green and Beckwith 1928). As the species was not specified, this might have meant either, or both, common and strawberry guava. A book published by the University of Hawai‘i in 1936 encouraged Territory residents to eat strawberry guava and other commonly available fruits to make up for inadequacies in diet (Miller et al. 1936). The use of strawberry guava as a food source in Hawai‘i has likely not much changed since then. Many residents and visitors to Hawai‘i pick and eat fresh strawberry guava right from the tree, and jellies and jams are still produced at the household level. Strawberry guava is often cited as a favorite of children and is noted as a pleasant recollection of childhood for many Hawai‘i residents.

In addition, the wood, fruit, and leaves of this species are used for various activities and products, both modern and ancient in origin. In this latter category, the typically hard, straight trunk and branches of strawberry guava have been used as a substitute wood in the manufacture of hula and lua implements when native species cannot be obtained.

Another consideration is the feedback relationship that has developed between strawberry guava and feral pigs, with significant consequences for the proliferation of the former and a potential concomitant increase in the range of the latter. The populations of feral pigs which now roam the forests of Hawai‘i are descendants of the introduced and more aggressive European boars, which interbred with and eventually displaced the smaller Polynesian pigs (Burrows et al 2007). As discussed elsewhere in this EA, pigs have since developed mutual relationships with invasive species, whereby pigs forage on the invasive plants, and then carry the seeds to other areas of the forest.

As also discussed elsewhere, the most likely result of a reduction in strawberry guava fruits would be for pigs to consume other available foods. It is unlikely that any significant impact on pig populations would be observed, although localized reductions in populations may occur in some areas. Without discounting the importance of pigs for subsistence in Hawai‘i, it is important to also consider the well-documented negative impact that pigs have on native species, many of which have cultural uses.

Cultural impact assessments for fencing and ungulate removal projects have considered the relationship between pigs, strawberry guava, and cultural resources before. A CIA for the 1,264 acre Kapunakea Preserve on Maui concluded that, “Strawberry guava is a weedy tree spreading rapidly in the West Maui Mountains, in part, because of the foraging of feral pigs....[it] forms impenetrable thickets and develops strong root systems that can destroy the integrity of an archaeological site” (Gon 2008:12). Invasive vegetation control is always a concern when considering the long-term preservation of archaeological resources. On a roughly 350-acre section of land owned by Kamehameha Schools in the upland portions of Kahalu‘u Ahupua‘a in North Kona, strawberry guava was identified as one of the most significant threats to the roughly 3,500 archaeological features of the remnant agricultural fields documented on their property (Rechtman Consulting 2004). The only techniques currently available for control of invasive

vegetation in and around archaeological sites are herbicides and hand-clearing. Mechanized clearing is out of the question as it also results in the destruction of the archaeological features.

Healthy native forests abound in cultural resources. The uses of native wet and mesic forest plants in traditional Hawaiian culture, and their appearances in Hawaiian mythology, are extensive (see Kraus 1993). Many of the native trees, herbs, and ferns in the forest formerly provided or still provide flowers, leaves, wood, and sap for products such as hula implements and decoration, la‘au lapa‘au (medicinal plants), dyes for kapa, and countless other traditional products. However, the relationship goes deeper than simple exploitation of natural resources. In the traditional Hawaiian viewpoint, the natural and cultural, and the physical and spiritual, are not separate, but an integrated whole. Native plants represented the physical forms, or kinolau, of the ancestral deities called ‘aumakua. The upland forests, now some of the last refuge for native Hawaiian plants and animals, were once considered the dwelling place of the gods. These wao akua regions were sacred. Only individuals who had performed certain spiritual preparations could enter this realm, and then only for specific purposes. Taking care of the land, or malama ‘aina, therefore helps sustain the culture, and the integrity of the ahupua‘a, the forests and the watersheds from mauka to makai, is a critical part of this care. If lowland and mid-elevation rainforests of the Hawaiian Islands degrade into a virtual monoculture of strawberry guava, far more than biological diversity will be lost. Chants and mele that celebrate the sights, sounds and aromas of the forest will have meanings that can no longer be physically experienced.

Consultation

As part of the planning process for the proposed action, five public meetings were held, one each on O‘ahu, Maui, and Kaua‘i, and two on Hawai‘i Island, one in Kona and one in Hilo. Relative to potential cultural issues, public comments fell into two general categories: support for the proposed project on the grounds that the native forests (as cultural resources) need to be restored; and opposition to the proposed project (primarily heard on Kaua‘i) based on the fear that the reduction in strawberry guava will lead to a reduction in feral pig populations and thus have an effect on subsistence activities, namely the hunting of feral pigs. While most Hawaiian cultural specialists (see Burrows et al 2007) would agree that pig hunting was not a traditional cultural practice, hunting pigs for sport and for subsistence has become a customary practice for many Hawai‘i residents, independent of ethnic background. As Maly (2004) pointed out based on an extensive review of more than 60,000 native Hawaiian land documents dating between 1846 to 1910, “nearly every reference was in the context of them [pigs] being near-home and as being cared for (raised), not hunted.” While the CIA specifically did not identify pig hunting as a cultural practice, because it lacks an association with a specific ethnic or cultural group, the assessment recognized the potential secondary effects of the biocontrol action on pig hunting activities merit consideration in the context of socioeconomic impacts (see Section 3.5).

In recognition of the effects of strawberry guava on native forests and the natural and cultural resources contained therein, the CIA also incorporated a consultation process with native Hawaiian cultural practitioners with connections to Hawai‘i’s forest resources. Dawn Chang of

Ku‘iwalu LLC conducted the consultations on several islands. Table 5 lists the individuals consulted.

Since its introduction to Hawai‘i roughly 180 years ago, strawberry guava has become known in Hawaiian as waiawī (the yellow variety) and waiawī ula‘ula (the red variety). None of the consultants identified any traditional cultural practices or belief associated with strawberry guava. While there was some discussion about the use of guava leaves for medicinal purposes, it was clearly the kuawa, or common guava, that was being referred to, not the strawberry guava.

Table 5
Cultural Consultants

<i>Name</i>	<i>Association</i>	<i>Affiliation</i>	<i>Date</i>
Samuel Gon, III	Cultural practitioner	Nature Conservancy	3/23/09
Lloyd Case	Cultural practitioner/Subsistence hunter	Hawai‘i Wilderness Association	4/2/09
Leimana DaMate	Cultural practitioner	Aha Kiolo Advisory Committee	4/2/09
Jonathan Scheuer	Land manager	OHA	4/16/09
Chuck “Doc” Burrows	Cultural practitioner	Ahahui Malama I Ka Lokahi	4/16/09
Kale Gumapac	Cultural practitioner	Kanaka Council	3/3/09
Ben Tajon	Cultural practitioner	Kanaka Council	3/3/09
Huihui Kanakaole	Cultural practitioner	Edith Kanakaole Foundation	5/5/09

It was noted that cultural practitioners, including hula and lua halau and woodcrafters, may use strawberry guava wood in the place of harder to acquire native species for the manufacture of certain implements. However, both Sam Gon and Doc Burrows commented that practitioners should be using the native woods rather than introduced woods, and that if strawberry guava is not controlled, there will be even fewer native woods available for cultural use. In a video prepared to provide information on biocontrol of strawberry guava, Sam Gon said:

“As a conservation biologist, and a Hawaiian cultural practitioner, it breaks my heart to see these dark thickets of strawberry guava crowding out the native trees and plants that should be growing here....Strawberry guava has been in Hawai‘i so long and is so common in our forests that some people make use of it as a resource. Its wood can be used for hula implements and tools, and its fruits are edible. But as a Hawaiian cultural practitioner, I think strawberry guava is a sorry substitute for what we should be using for our implements and tools. We should be using our native trees: ‘ohi‘a, alahe‘e, lama, olopuu, and dozens of other species that are being destroyed by a single foreign species” (Sam Gon, video interview, 2009). <http://www.youtube.com/watch?v=-pAh-At0HdM>

Lloyd Case and Leimana DaMate also stated that many people on the Big Island use strawberry guava wood for making smoke meat. Lloyd also expressed concerns as a subsistence pig hunter

about the potential adverse impacts to the pig populations that may rely on strawberry guava as a food source.

All of the consultants expressed concerns regarding adverse impacts to native forest resources that will continue to occur as the result of the uncontrolled spread of strawberry guava. Jonathan Scheuer, speaking on behalf of OHA, felt strongly that if nothing is done now, the native forests in Wao Kele O Puna on the Big Island will be destroyed. OHA recently acquired Wao Kele O Puna and as cultural stewards of the land, has a kuleana or responsibility to ensure that the native forests are sustained and available for future generations. The cultural landscape of this and other native forests is a very significant resource which must be protected. While Huihui Kanakaole recognized the importance of protecting the native forests from invasive species, she stated that the Edith Kanakaole Foundation opposes the use of biocontrol measures, because they find no cultural basis in Hawaiian chants to support such a practice. Sam Gon and Doc Burrows spoke about protecting Hawai'i's native forests from invasive species so that cultural practitioners have resources to gather.

Sam Gon spoke about the ahupua'a land management concept and how everything is interconnected and interrelated from a Hawaiian cultural perspective. He shared that from his experience there is a visible difference in the water quality of streams in the vicinity of native forests as compared to forests comprised of non-native species. In the former instance the water is clean and clear and in the latter, the water appears dirty and murky.

As for the cultural appropriateness of the use of a biocontrol agent to manage strawberry guava, while all the cultural consultants agree that something needs to be done to protect the native forests to ensure that Hawaiians and others have access to exercise their traditional customary practices, and that the strawberry guava threatens the health of our native forests, there is some debate as to whether biocontrol is the culturally appropriate option. Kale Gumapac and Ben Tajon of Kanaka Council expressed concerns that all available options should be exhausted before the use of biocontrol to manage the growth of strawberry guava. Huihui Kanakaole of the Edith Kanakaole Foundation would prefer that the approach focus on getting families to reconnect with the native forests so that they would exercise their kuleana to care for the resources. Sam Gon of the Nature Conservancy, Doc Burrows of the Aha Kiole Advisory Committee, and Jonathan Scheuer of the Office of Hawaiian Affairs see the problem as very urgent, and they are convinced that biocontrol is an appropriate measured response and the only effective means of controlling the growth of strawberry guava, which will afford the native forests a chance to recover. None of the cultural consultants suggested that strawberry guava thickets are a resource that should be saved; rather they expressed their differences on the approach for controlling its spread.

Identification of Cultural Resources, Practices, and Beliefs

The OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are natural features of the landscape and historic sites, including traditional cultural properties. A working definition of traditional cultural property is any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in an ethnic community's history and contribute to maintaining the ethnic community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both.

The origin of the concept of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service. "Traditional" as it is used, implies a time depth of at least 50 years, and a generalized mode of transmission of information from one generation to the next, either orally or by act. "Cultural" refers to the beliefs, practices, lifeways, and social institutions of a given community. The use of the term "Property" defines this category of resource as an identifiable place. Traditional cultural properties are not intangible, and they must have some kind of boundary. They are subject to the same kind of evaluation as any other historic resource, with one very important exception. By definition, the significance of traditional cultural properties should be determined by the communities that values them.

The definition of "Property" contains an inherent contradiction that complicates identification and evaluation of potential Hawaiian traditional cultural properties, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often cosmologically tied to landscape and all its other features. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place.

A further analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities resulted from the *Ka Pa'akai O Ka'āina v Land Use Commission* court case. The court decision established a three-part process relative to evaluating such potential impacts: first, to identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised; second, to identify the extent to which those resources and rights will be affected or impaired; and third, specify any mitigation actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

Impacts of the Action Alternative and Mitigation Measures

During the course of this study there were no cultural resources, practices or beliefs identified to be directly associated with strawberry guava. There were no stands of strawberry guava identified as traditional cultural places, and a review of the ethnobotanical literature (i.e., Gutmanis 1976; Handy et al. 1972; Krauss 1993; Neal 1965; Palmer 2003) failed to identify any cultural uses of strawberry guava.

There is, however, a single strawberry guava tree located on the historic Walker Estate in Nu‘uanu that has been placed on Oahu’s Exceptional Tree List. Trees are generally added to this list based on significant age and/or size, and owners receive a tax credit for the care of those trees. If this specific tree were to become infested with *T. ovatus*, it would not lead to mortality, but rather leaf galls and inhibited fruiting. If these effects occur, become noticeable, and are considered undesirable, the effects on *T. ovatus* on this single tree can be mitigated through the application of widely available horticultural oils, just as horticulturists commonly apply to many landscaped ornamentals.

The action alternative will have no adverse impact on any cultural resources, practices or beliefs, and it will serve to enhance valued natural and cultural resources within Hawai‘i’s forested areas and beyond.

No Action Alternative

Conversely, when considering the areas that strawberry guava invades, many would agree that the native forests of all of Hawai‘i’s islands are part of a general cultural landscape; and thus, from an indigenous perspective and with respect to this study, should be considered a cultural property. The uncontrolled spread of strawberry guava throughout these areas can be seen as a significant cultural impact, particularly as it affects plants, animals and landscapes used for cultural practices.

Furthermore, strawberry guava has also invaded formerly forested areas that ancient Hawaiians cleared and used for agricultural practices, most significantly on Maui and Hawai‘i islands. The threat to the archaeological resources of these areas from the spread of strawberry guava is enormous, both as a result of natural processes and during attempted mechanical control. The no action alternative would lead to continued cultural impacts and provides no mitigative relief for such impacts.

The no action alternative would have an unmitigated negative impact that would lead to continued degradation of Hawai‘i’s valued natural and cultural resources.

3.5 Socioeconomic Conditions

Action Alternative

Probably the comment that has been expressed most frequently concerning the effects of this biocontrol project is the potential to eliminate or severely reduce the beneficial uses of guava for households, particularly low-income households. Residents reported eating the fruit raw, using it in jams and jellies (some of which were traded or informally sold), chutney and even spaghetti sauce. In addition, the wood was reportedly used for firewood, charcoal, fruit poles, farming implements, fencing, cultural products such as hula sticks, and even bentwood furniture. One commenter reported that strawberry guava leaves can be used medicinally to treat diarrhea (although traditional diarrhea medicine usually involves common guava leaves, not strawberry guava). Of concern were the following potential impacts:

- Potential to reduce the quantity and to adversely affect the quality of strawberry guava fruit for human consumption;
- Potential to reduce the quantity and quality of wood that residents cite has a variety of uses: firewood, fruit poles, farming implements, medicine, cultural products, and furniture;
- Potential to eliminate the food source for animals that are valued for hunting, particularly the pig;
- The potential for these impacts to disproportionately affect low-income and minority populations, raising issues of environmental justice.

In reality, although *T. ovatus* reduces the vigor of the plant and is expected to reduce vegetative growth and fruit production substantially, there will still be abundant fruit, wood and leaves (the gall areas can simply be cut away or leaves without galls can be used). Considering the hundreds of thousands of acres with strawberry guava in conservation areas alone, even the estimated 60 to 90 percent reduction in fruiting and 25 to 40 percent reduction in vigor would leave enormous untapped resources of wood and fruit. Although residents see the fruit that emerges on isolated trees or shrubs and from the edges of thickets, most strawberry guava fruit is produced on the top branches of tall, narrow trees within the middle of the thickets. This fruit in the center of these thickets is not available for harvesting, and the wood of trees inside these “guava jails” is also not readily accessible for use.

As discussed in Section 3.1.2, above, wild pigs do make use of strawberry guava seasonally, but it is unlikely that the fruits are an essential part of their diet. A secondary human use of strawberry guava is the consumption of the fruit by feral pigs (*Sus scrofa*), which are hunted for their meat. Although pigs are omnivorous, studies of feral pig diets in Hawai‘i have found that plant materials make up most of their diet. The diet is strongly influenced by habitat, and so a pig’s diet may be as little as 0 percent or as much as 70 percent sweet fruits such as papaya, passion fruit, and strawberry guava. Since fruits are seasonally available, the amount of fruit consumed is dependent on the season as well as location, and pigs are noted to move into different areas when fruits are available. The varied diet includes a significant consumption

(over 50 percent) of ferns and grasses, as well as earthworms and carrion for protein (Noguiera et al 2007). Pigs are omnivores and can utilize a variety of resources; high protein resources such as earthworms are preferred. Many high-elevation areas of Maui and the Big Island that lack strawberry guava are heavily infested with pigs, and it is unlikely that even a substantial reduction of strawberry guava fruit would have a major impact on pig populations. Because less dense stands of strawberry guava would promote better human access, it might even be possible that hunting success could be increased by the biocontrol action.

The expected reduction of density and strawberry guava monoculture should also have a beneficial impact on the ability to travel within the forest, whether for gathering for cultural purposes (as discussed in Section 3.4) or for hiking or birding. Strawberry guava thickets make it more difficult and expensive to create and maintain trails and recreation areas. Many comments at public meetings and to the original EA indicated that this would be highly beneficial.

Environmental justice is a term that refers to social inequity in bearing the burdens of adverse environmental impacts. Certain socioeconomic groups in the United States, including ethnic minorities and low-income residents, have historically experienced a disproportionate share of undesirable side-effects from locally undesirable land uses such as toxic waste dumps, landfills, and freeway projects (Cutter 1995). Executive Order (EO) 12898 requires federal agencies to take appropriate and necessary steps to identify and avoid disproportionately high and adverse effects of federal projects on the health and environment of minority and low-income populations. Because of the participation of the federal agency, the U.S. Fish and Wildlife Service, compliance with this order is necessary. In addition, in Act 294 of 2006, the Hawai'i Legislature directed consideration of environmental justice concerns where there are disproportionate impacts on the environment, human health, and socioeconomic conditions of Native Hawaiian, minority, and/or low-income populations.

The action's expected impact on strawberry guava trees, considered in light of the continuing availability of extremely large quantities of fruit and wood, the better forest access, the indeterminate and perhaps even positive impacts to hunting, and the cultural importance of native forest resources to Native Hawaiians, do not represent disproportionate impacts upon low-income and minority families and individuals.

Mitigation Measures

As discussed in Section 3.2.1 above, infestation of *T. ovatus* can be controlled at the household level by application of appropriate insecticides, including organic horticultural oil sprays that are compatible with production of fruit for consumption (Cranshaw and Day 1994).

No Action Alternative

Under the no action alternative, no biocontrol of strawberry guava would be attempted, and the efforts to reduce the abundance and range of this species would be restricted to chemical and

manual methods that could only deal with limited areas. No reduction in fruit or wood would occur, but forest access in existing and expanded strawberry guava-dominated areas would be increasingly difficult.

3.6 Scenic Resources

Action Alternative

Comments at public meetings and in other channels revealed that many find strawberry guava an attractive plant, whether in yards or along roadsides. The dark green foliage and multi-colored bark can be striking. There is thus concern that *T. ovatus* may be damaging to the aesthetic value of scenic roadside or ornamental yard plantings of strawberry guava.

The leaf galls produced by *T. ovatus* in Brazil do not lead to severe defoliation or deformities in the tree, as shown in Figure 2, above. Severe defoliation would result mainly from an unusual combination of stresses such as prolonged drought (which would also affect most other plants). It is worthwhile to note that ‘ohi‘a, celebrated for its grace and beauty in Hawaiian songs and chants, exhibits leaf galls produced by a native co-evolved insect, without any loss of its general attractiveness. At the close-up scale (for example, if strawberry guava is used as a potted plant), however, the leaf galls may be perceived as unattractive. The majority of residents will be unaware that *T. ovatus* is feeding on individual strawberry guava trees, just as they are usually unaware that many other wild plants near their homes contain gall insects, as the effects are subtle unless individual branches and leaves are closely examined. Whereas there may be some decrease in the attractiveness of strawberry guava plants (reversible with the application of horticultural oil sprays), landscaping with islands of natural vegetation, which is highly attractive, will benefit from lessened competition from strawberry guava.

Other issues brought up during consultation were concerns about secondary scenic impacts – e.g., having strawberry guava replaced by less attractive non-native species, and the cumulative impacts to strawberry guava when added to the severe defoliation that has been produced by insects on wiliwili trees or pathogens on rose apple trees.

An invasive fungus called guava rust (*Puccinia psidii*), apparently introduced accidentally into Hawai‘i in 2005, infests a variety of plants in the myrtle family, including ‘ohi‘a, paperbark and rose myrtle, but affects rose apple most heavily (Anderson and Uchida 2008, Loope and LaRosa 2008). The rust produces bright yellow, spherical spores that easily become airborne. This has resulted in distribution of the disease to all major islands of Hawai‘i. Rose apple (*Syzygium jambos*) has been devastated, particularly moist windward sides of the islands. Newly-growing leaves are malformed and the trees appear sickly and unattractive.

Wiliwili (*Erythrina sandwicensis*) is an attractive red-flowered deciduous tree native to some of the driest parts of the Hawaiian Islands. An erect and leafy non-native variety was popular in landscaping as windbreaks and scenic barriers in both windward and leeward areas until the tiny invasive erythrina gall wasp (*Quadrastichus erythrinae*) began attacking wiliwili in 2005. So many galls are formed on the leaves, young stems, fruits and flowers that there is complete

defoliation in the non-native variety. State officials released another tiny wasp that lays its eggs on the erythrina wasp in November 2008, and the effectiveness of this agent is currently being evaluated.

Importantly, the observed effects of *T. ovatus* on strawberry guava are not similar to those produced by the guava rust or erythrina gall wasp, as it rarely causes defoliation. Galls formed on strawberry guava leaves are comparable to those that naturally occur on 'ohi'a, which affect the plant's metabolism but do not disfigure it. There will therefore likely be no adverse scenic effects to accumulate with those related to rose apple and wiliwili trees.

It should also be noted that many observers who are appreciative of native species and are concerned about the effects of strawberry guava find the plant an unattractive symbol of the devastation of the native forest and in fact would rather see native species such as 'ohi'a on roadsides. A reduction in strawberry guava, particularly if accompanied by an increase in native species, would enhance the scenic landscape for such individuals.

Mitigation Measures

As discussed in Section 3.5, the infestation of *T. ovatus* can be controlled at the household level by application of relatively innocuous insecticidal oil sprays (Cranshaw and Day 1994), which will reduce or eliminate leaf galls.

Another mitigation measure can be undertaken: to substitute other household or yard plants, such as native or non-invasive species, for strawberry guava. Nurseries sell a wide variety of such plants, and on various occasions such as Arbor Day and Earth Day, public institutions sell native trees at reduced prices or give them away.

No Action Alternative

Under the no action alternative, the biocontrol agent would not be released on State land, and potential scenic impacts could be avoided for those who find strawberry guava an attractive plant. The invasion of strawberry guava into native forests on State land would likely continue, causing scenic impacts for those who consider native plants to provide greater scenic value.

3.7 Consistency with Government Plans and Policies

3.7.1 Hawai'i State Plan

Adopted in 1978 and last revised in 1991 (Hawai'i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State's long-run growth and development activities. The three themes that express the basic purpose of the *Hawai'i State Plan* are individual and family self-sufficiency, social and economic mobility and community or social well-being. The proposed action is consistent with

State goals and objectives that call for preservation and restoration of natural, cultural and recreational resources.

The proposed action is in keeping with one of the goals in the Hawai‘i State Plan, which is maintaining stable natural systems, as stated in Section 226-4:

In order to guarantee, for present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve: ... (2) a desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.

The action is also in keeping with the “overall direction” of the Plan, namely that of improving the quality of life through proper management of the State’s land resources, as presented in Section 226-102:

The State shall strive to improve the quality of life for Hawaii’s present and future population through the pursuit of desirable courses of action in five major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, and quality education.

Discussion: The proposed action will help fulfill the goal of the plan by helping to restore stable natural systems, the uniqueness of which has been undermined by the invasion of strawberry guava. It fulfills the overall direction of the plan by contributing to management of land resources, namely native forests that are being degraded by invasion of strawberry guava.

Among the sections of the Hawai‘i State Plan most relevant to the proposed action are those centered on the theme of the physical environment.

The following objective and policies are taken from Section 226-11, which deals with land-based, shoreline and marine resources in the physical environment:

Objectives: Planning for the State’s physical environment with regard to land-based, shoreline and marine resources shall be directed towards achievement of the following objectives: (1) prudent use of Hawai‘i’s land-based, shoreline and marine resources and (2) effective protection of Hawai‘i’s unique and fragile environmental resources. To achieve those objectives, the Plan notes it shall be the policy of the state to:

- (a) Exercise an overall conservation ethic in the use of Hawai‘i’s natural resources.
- (b) Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.
- (c) Manage natural resources and environs to encourage their beneficial and multiple use without generating costly or irreparable environmental damage.

(d) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.

(f) Pursue compatible relationships among activities, facilities, and natural resources.

(g) Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational, and scientific purposes.

And from Section 226-12, regarding the scenic, natural beauty, and historic resources of the physical environment:

Objective: Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multi-cultural/historical resources. To achieve that objective, it shall be the policy of this State to:

(a) Promote the preservation and restoration of significant natural and historic resources.

(b) Provide incentives to maintain and enhance historic, cultural, and scenic amenities.

(c) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

(d) Protect those special areas, structures, and elements that are an integral and functional part of Hawai'i's ethnic and cultural heritage.

Also relevant is Section 226-13, which concerns land, air and water quality of the physical environment:

Objectives: Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following: (1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources, and (2) Greater public awareness and appreciation of Hawaii's environmental resources. To achieve those objectives it shall be the policy of the State to:

(a) Foster educational activities that promote a better understanding of Hawai'i's limited environmental resources.

(b) Promote the proper management of Hawaii's land and water resources.

(c) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.

(d) Foster recognition of the importance and value of the land, air and water resources to Hawai'i's people, their cultures and visitors.

Discussion: Hawai'i's natural resources continue to be threatened by the strawberry guava, which diminishes the scenic beauty, biodiversity and watershed values of the native forest. The proposed action would help protect rare and or endangered plant as well as animal species dependent upon native food and habitat. Once established, the dominance of the strawberry guava hampers accessibility and use of inland areas for public recreational, educational and scientific purposes. The action will help conserve the State's natural resources, namely native forests and ecosystems, thereby helping to protect rare and endangered plant species and habitats currently being overrun by the alien strawberry guava. The action also serves to educate both

residents and visitors of the threat posed by invasive species to native environments and on the role biocontrol can play in controlling that threat.

Other sections of the Hawai‘i State Plan relevant to the proposed project are those centered on the theme of socio-cultural advancement. The following objective and policies are taken from Section 226-25 dealing with culture:

Objective: Planning for the State’s socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people. To achieve the objective, it shall be the policy of this State to:

- (a) Foster increased knowledge and understanding of Hawai‘i’s ethnic and cultural heritages and the history of Hawai‘i.
- (b) Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawai‘i’s people and which are sensitive and responsive to family and community needs.
- (c) Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawai‘i.

The following objective and policies are taken from Section 226-23 regarding leisure and socio-cultural advancement:

Objective: Planning for the State’s socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations. To achieve the leisure objective it shall be the policy of the State to:

- (a) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved.
- (b) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.
- (c) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs.
- (d) Assure adequate access to significant natural and cultural resources in public ownership.

Also relevant to the proposed project are the objective and policy from Section 226-27 pertaining to government and socio-cultural advancement:

Objective: Planning the State’s socio-cultural advancement with regard to government shall be directed towards the achievement of efficient, effective, and responsive government services at all levels in the State. To achieve that objective, it shall be the policy of this State to:

- (a) Provide for necessary public goods and services not assumed by the private sector.

Discussion: The proposed action would help protect native plants and other resources that are traditionally collected and used for cultural purposes. Protecting those resources would further the Plan's desire to promote educational programs which enhance the understanding of Hawai'i's cultural heritage for residents and visitors alike. It will also improve access to non-urban areas used for recreational purposes by slowing the growth of strawberry guava which can form dense thickets that impede travel, increasing accessibility of those cultural resources.

Other relevant portions of the sections pertaining to socio-cultural advancement include §226-20, which calls for the fulfilling of basic individual health needs and maintaining environmentally healthful conditions in Hawai'i's communities through the prevention of contamination by pesticides and other potentially hazardous substances; and §226-21, which seeks the promotion of educational programs which enhance understanding of Hawai'i's cultural heritage. Also applicable is §226-8, objective and policies for the economy as it involves the visitor industry, which calls for the fostering of an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawai'i's culture and values.

Discussion: The action may reduce the need for herbicides to control the strawberry guava in many areas, but in other areas, combining the effects of biocontrol with additional mechanical and chemical control methods may prove effective. It is thus important that herbicides be applied carefully in conformance with State and federal laws. And as previously discussed, the effort will result in an increased understanding of the importance of native plants long used in native Hawaiian cultural activities.

The proposed action supports all relevant objectives and policies of the Hawai'i State Plan. It is worthwhile to note that although substantial reduction of fruiting will occur, there will still be abundant fruit and wood, and individual trees or shrubs can be protected from *T. ovatus* infestation using environmentally benign horticultural oil sprays, if desired.

3.7.2 Hawai'i County General Plan

The *General Plan* for the County of Hawai'i is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawai'i. The plan was adopted by ordinance in 1989 and revised in 2005 (Hawai'i County Department of Planning). The *General Plan* itself is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawai'i. Most relevant to the proposed project are the following Goals, Policies and Standards of particular chapters of the General Plan:

Environmental Quality – Goals

- Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island are viable and sustainable.
- Maintain and, if feasible, improve the existing environmental quality of the island.
- Control pollution.

Environmental Quality – Policies

- Take positive action to further maintain the quality of the environment.
- Advise the public of environmental conditions and research undertaken on the island's environment.

Environmental Quality – Standards

- Pollution shall be prevented, abated, and controlled at levels that will protect and preserve the public health and well being, through the enforcement of appropriate Federal, State and County standards.
- Incorporate environmental quality controls either as standards in appropriate ordinances or as conditions of approval.
- Federal and State environmental regulations shall be adhered to.

Discussion: The proposed action will fulfill requirements of the Hawai'i County General Plan by maintaining, and, to a degree, improving the environmental quality of the island by slowing the spread of an invasive species threatening the quality of native forests.

Natural Beauty – Goals

- Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.
- Protect scenic vistas and view planes from becoming obstructed.
- Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

Discussion: The proposed action will slow the growth of an alien species which crowds out native forest plants, thereby helping to preserve the natural beauty of the island (in particular, that of its native forests) as set forth in this section of the Plan. Scenic impacts to hedgerows of strawberry guava will be minor, as the leaf galls do not disfigure the appearance of vegetation except from very close. The expected greater health and prevalence of native trees will produce scenic benefits.

Natural Resources and Shoreline – Goals

- Protect and conserve the natural resources from undue exploitation, encroachment and damage.
- Protect and promote the prudent use of Hawaii's unique, fragile, and significant environmental and natural resources.
- Protect rare or endangered species and habitats native to Hawaii.
- Protect and effectively manage Hawaii's open space, watersheds, shoreline, and natural areas.

Natural Resources and Shoreline – Policies

- Encourage a program of collection and dissemination of basic data concerning natural resources.
- Coordinate programs to protect natural resources with other government agencies.

- Encourage public and private agencies to manage the natural resources in a manner that avoids or minimizes adverse effects on the environment and depletion of energy and natural resources to the fullest extent.
- Encourage an overall conservation ethic in the use of Hawaii's resources by protecting, preserving, and conserving the critical and significant natural resources of the County of Hawaii.
- Encourage the protection of watersheds, forest, brush and grassland from destructive agents and uses.
- Work with the appropriate State, Federal agencies, and private landowners to establish a program to manage and protect identified watersheds.
- Create incentives for landowners to retain and re-establish forest cover in upland watershed areas with emphasis on native forest species.

Natural Resources and Shoreline – Standards

- The following shall be considered for the protection and conservation of natural resources:
- Areas necessary for the protection and propagation of specified endangered native wildlife, and conservation for natural ecosystems of endemic plants, fish and wildlife.
- Lands necessary for the preservation of forests, park lands, wilderness and beach areas.

Discussion: The proposed action is designed to protect natural forests from encroachment by an invasive species. In the process it will manage and protect unique, fragile and significant natural resources, including watersheds and natural areas.

Land Use – Public Lands - Goal

- Utilize publicly owned lands in the best public interest and to the maximum benefit for the greatest number of people.

Land Use – Public Lands – Policy

- Encourage uses of public lands that will satisfy specific public needs, such as housing, recreation, open space and education.

Land Use – Public Lands - Standard

- Public lands with unique recreational and natural resources shall be maintained for public use.

Discussion: The proposed action fulfills the Plan's Land Use section by helping to protect publicly owned lands with unique recreational and natural resources from further expansion by an alien species.

3.7.3 Kaua‘i County General Plan

The *General Plan* for the County of Kaua‘i is the document expressing the broad goals and policies for the long-range development and resource management for the Island of Kaua‘i. First adopted in 1971, the Plan was revised in 1984 and 2000. The *General Plan* is thematically arranged, discussing issues (in Chapters 3-8) including management of public facilities, preservation of rural character, and caring for land, water, and culture, among others. The General Plan also includes a chapter entitled “*Vision for Kaua‘i 2020*” that discusses roads, utility systems, and other public facilities and services.

Policies are summarized in two policy maps, a Land Use Map depicting policy for long-range land uses and a Heritage Resource map showing important historic, cultural and scenic resources discussed in the General Plan text. There are also discussions of the specific strategy for implementation for each policy element. The Plan’s structure and content were the result of much public input and participation, including a public workshop involving about 3,000 citizens and 60 community groups, and also input from the Citizens Advisory Committee. Pertinent sections are presented below:

Native Hawaiian Rights – Policy

Under the State Constitution and the County Charter, the County of Kaua‘i is empowered to promote the health, safety and welfare of all inhabitants without discrimination as to ethnic origin. As part of carrying out its responsibilities under the Constitution and the Charter, the County recognizes the rights of native Hawaiians and the laws concerning lands and waters that have been established through the State Constitution, State and Federal laws, and State and Federal court decisions. No County ordinance or rule shall modify or diminish these rights:

- Traditional and customary rights of Native Hawaiians, such as for access and gathering, provided under the State Constitution and Hawai‘i Revised Statutes, as interpreted by the courts (i.e., the PASH case).

Discussion: The proposed action will help maintain a supply of native plants such as those gathered for cultural purposes.

Community Values

- Protection, management, and enjoyment of our open spaces, unique natural beauty, rural lifestyle, outdoor recreation and parks.
- Conservation of fishing grounds and other natural resources, so that individuals and families can support themselves through traditional gathering and agricultural activities.
- Access to and along shorelines, waterways and mountains for all. However, access should be controlled where necessary to conserve natural resources and to maintain the quality of public sites for fishing, hunting, recreation and wilderness activities valued by the local community.
- Recognition that our environment IS our economy, our natural capital, the basis of our economic survival and success.

- Respect and protection for the values and rights of our many cultures, in compliance with our laws and responsibilities as citizens.
- Appreciation and support for the visitor industry's role in preserving and honoring all cultures and their values as Kaua‘i’s leading source of income and as a supporter of community festivals, recreation, arts and culture.
- Protection of Kaua‘i’s unique character.

Discussion: The proposed action will help protect and manage the island’s natural beauty and resources and opportunities for traditional gathering for cultural purposes. It will also increase access by slowing the spread of thickets of strawberry guava. The result of these benefits will be protection of the environment and Kaua‘i’s unique character.

It should be noted that Kaua‘i General Plan defers responsibility for forest and natural area reserves and state parks, saying: “The State of Hawai‘i plays the preeminent role in managing natural resources....In addition to their value as forested watershed, these lands also harbor rare and endangered plant and animal species and areas where the native ecosystem remains relatively intact.” That section concludes: “In summary, the DLNR holds many responsibilities in caring for Hawai‘i’s special lands, waters, and cultural resources. In regulating land use on urban and agricultural lands, the County seeks expert advice from DLNR on aquatic and marine resources, streams, rare and endangered species, and historic and archaeological resources.”

Caring for Land, Waters and Culture

The Vision for Kaua‘i 2020 section of the Kauai County General Plan states:

“The people of Kaua‘i, along with the State and County governments, practice careful stewardship of the island’s land and waters. The high mountains, forested watershed areas, the ocean and coral reefs, beaches – these areas are managed as part of the public lands trust. Over 50 percent of Kaua‘i’s land area lies in the undeveloped highlands of central Kaua‘i and the steep cliffs and valleys of the Na Pali Coast. Major landmarks include the peaks of Wai‘ale‘ale and Kawaikini; Waimea Canyon, and the Alaka‘i Swamp. Nurtured by careful conservation practices, these lands support recovering populations of native forest birds and other native plant and animal species.....

Through planning and land use regulations, the County of Kaua‘i carefully safeguards its heritage of ecologically- and culturally-important lands, waters and sites. Through planning, the County identifies important resources and sets forth policies for responsible conservation and appropriate development. Zoning and other land use regulations are based on clearly defined policy and design objectives. The County avoids rigid land use formulas in favor of flexibility in achieving desired ends.”

Discussion: The proposed action will benefit the natural, cultural and scenic heritage of Kaua‘i.

3.7.4 Maui County General Plan

The *General Plan* for Maui County was originally adopted by ordinance in 1980 and revised in 1991. The Maui County General Plan 2030 is in draft form and is still under consideration by the Maui County Council. It is based on five themes: protecting Maui County's agricultural land and rural identity, preparation of a directed and managed growth plan, protecting Maui County's shoreline and limiting visitor industry growth, maintaining a viable economy that offers diverse employment opportunities for residents, and providing for needed resident housing. Described as a "statement of residents' needs and desires," the plan in its latest form incorporated recommendations from Decisions Maui, a program consisting of eight regional citizen teams from Molokai, Lanai and Maui, and other input from a series of community meetings across the county. The portions of the plan pertaining to the proposed action are as follows:

Land Use

Objective: To preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County. Policies toward that end include:

- Identify and preserve significant historic and cultural sites.

Discussion: The proposed action will help protect and preserve native plants traditionally used by cultural practitioners.

Objective: To use the land within the County for the social and economic benefit of all the County's residents. Policies include:

- Mitigate environmental conflicts and enhance scenic amenities, without having a negative impact on natural resources.

Discussion: The proposed action will slow the incursion of strawberry guava that is impacting and dominating native forests.

Environment

Objective: To preserve and protect the county's unique and fragile environmental resources.

Police to achieve that include:

- Preserve for present and future generations the opportunity to experience the natural beauty of the islands.
- Preserve scenic vistas and natural features.
- Support programs to reduce air, land and water pollution.
- Support programs to protect rare and endangered species and programs which will enhance their habitat.
- Discourage the introduction of noxious foreign species into Maui County's unique island ecosystems.

Discussion: The proposed action will slow the spread of the alien strawberry guava into unique island ecosystems containing rare and endangered species, helping to preserve the County's natural features.

Objective: To use the County's land-based physical and ocean-related coastal resources in a manner consistent with sound environmental planning practice. Policies include:

- Preserve, enhance and establish traditional and new environmentally sensitive access opportunities for mountain and ocean resources.

Discussion: The action will slow the spread of an invasive alien plant species which grows into thick, dense stands which inhibit access to forested areas.

Cultural Resources

Objective: To preserve for present and future generations the opportunity to know and experience the arts, culture and history of Maui County. Policies toward that end include:

- Encourage the recordation and preservation of all cultural and historic resources, to include culturally significant natural resources.
- Establish programs to restore, maintain and interpret significant cultural districts, sites and artifacts in both natural and museum settings.
- Identify and maintain an inventory of significant and unique cultural resources for special protection.

Recreation and Open Space

Objective: To provide high-quality recreational facilities to meet the present and future needs of our residents of all ages and physical ability. Policies include:

- Maintain the natural beauty of recreational areas.

Objective: To provide a wide range of recreational, cultural and traditional opportunities for all our people. Policies that apply include:

- Encourage the use of public facilities for both cultural and recreational activities.
- Foster an increased awareness of the ethnic and cultural heritage of our people.
- Encourage the identification, restoration and preservation of important archaeological, historical and cultural sites.
- Encourage the use of public lands to expand and enhance outdoor recreational and cultural opportunities.

Discussion: Slowing the spread of the invasive plant will help preserve sources of native plants used in cultural activities, which in turn will foster additional awareness of those traditions. Recreational activities will be improved by slowing growth of strawberry guava which can impede access to natural areas.

Special Programs

Objective: To create a community in which the needs of all segments of the population will be recognized and met. Policies include:

- Support Federal, State and County programs and services designed to improve the general welfare and conditions of Native Hawaiians.

Government

Objective: Improve the delivery of services by government agencies to all community plan areas. Policies include:

- Support programs that will increase the overall effectiveness of government so as to provide greater responsiveness to the needs of our people.

Discussion: The proposed action, which will help preserve access to culturally important native plant materials, is supported by agencies of both the State and Federal governments.

3.7.5 City and County of Honolulu General Plan

The *General Plan* for the City and County of Honolulu is a planning document described as a “written commitment by the City and County government to a future for the Island of Oahu which it considers desirable and attainable.” The plan has a two-fold mission: first, it is a statement of the long-range social, economic, environmental and design objectives for the general welfare and prosperity of the people of Oahu, and second, it is a statement of broad policies to facilitate attainment of those objectives. The plan contains 11 subject areas of public policy that include population, economic activity, the natural environment, transportation, public safety, culture and recreation and government operations. The plan was first adopted in 1977 and has been revised nine times since, concluding with the 1992 version which was further amended a decade later. The portions most relevant to the proposed project are as follows:

Natural Environment

Objective: To protect and preserve the natural environment. Policies to achieve that include:

- Seek the restoration of environmentally damaged areas and natural resources.
- Protect plants, birds and other animals that are unique to the State of Hawai‘i and the Island of Oahu.
- Increase public awareness and appreciation of Oahu’s land, air and water resources.

Objective: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors. Policies include:

- Protect the Island’s well-known resources: its mountains and craters; forests and watershed areas; marshes, rivers and streams; shoreline, fishponds and bays; and reefs and offshore islands.
- Protect Oahu’s scenic views, especially those seen from highly developed and heavily traveled areas.
- Provide opportunities for recreational and educational use and physical contact with Oahu’s natural environment.

Discussion: The proposed action would help fulfill the portions of the plan calling for restoration of environmentally damaged areas and natural resources, help protect unique plants and increase public awareness of threats posed by invasive species. By slowing the creation of dense stands of strawberry guava the action would help provide access opportunities to Oahu's natural environment.

Culture and Recreation

Objective: To foster the multiethnic culture of Hawai'i. Polices include:

- Encourage the preservation and enhancement of Hawai'i's diverse cultures.
- Encourage greater public awareness, understanding and appreciation of cultural heritage and contributions to Hawai'i made by the City's various ethnic groups.
- Encourage opportunities for better interaction among people with different ethnic, social and cultural backgrounds.
- Encourage the protection of the ethnic identities of the older communities of Oahu.

Objective: To protect Oahu's cultural, historic, architectural and archaeological resources.

Polices include:

- Cooperate with the State and Federal governments in developing and implementing a comprehensive preservation program for social, cultural, historic, architectural and archaeological resources.
- Promote the interpretive and educational use of cultural, historic, architectural and archaeological sites, buildings and artifacts.
- Seek public and private funds, and public participation and support, to protect social, cultural, historic, architectural and archaeological resources.
- Provide incentives for the restoration, preservation and maintenance of social, cultural, historic, architectural and archaeological resources.

Discussion: The proposed action will help to preserve resources such as native plants used in cultural traditions thereby promoting their use and educational value and embracing Hawai'i's diverse cultural traditions.

3.7.6 Hawai'i Wildlife Action Plan

Hawaii's Comprehensive Wildlife Conservation Strategy (CWCS) is an interagency initiative that comprehensively reviewed the status of the full range of the State's native terrestrial and aquatic species (Mitchell et al 2005). The Hawai'i Department of Land and Natural Resources (DLNR) took the lead in preparing the CWCS. A combination of traditional outreach, such as public meetings and technical workshops, with 'modern' outreach, such as the development of a website and use of email, was used to invite and expand participation in the development of the CWCS. The collaborative nature of the effort, which involved resource managers, biologists, and concerned individuals statewide, indicates broad support and the likelihood that the conservation strategies identified will be implemented by multiple partners, including DLNR. Development of the CWCS allows as participation in the State Wildlife Grant (SWG) program

administered by the U.S. Fish and Wildlife Service (USFWS). The CWCS of every state required the following eight elements:

- 1) Information on the distribution and abundance of species of wildlife identified as “species of greatest conservation need,” including low and declining populations, as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State’s wildlife;
- 2) Descriptions of the locations and relative condition of key habitats and community types essential to the conservation of species identified in (1);
- 3) Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats;
- 4) Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions;
- 5) Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions;
- 6) Descriptions of procedures to review the plan at an interval not to exceed ten years;
- 7) Plans for coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats;
- 8) Provisions to ensure public participation in the development, revision, and implementation of projects and programs.

As part of the research and policy formulation, the CWCS determined the major threats facing Hawai‘i’s native wildlife are common to most species groups and habitats:

- Loss and degradation of habitat resulting from human development, alteration of hydrology, wildfire, invasive species, recreational overuse, natural disaster, and climate change;
- Introduced invasive species (e.g., habitat-modifiers, including weeds, ungulates, algae and corals, predators, competitors, disease carriers, and disease);
- Limited information and insufficient information management;
- Uneven compliance with existing conservation laws, rules and regulations;
- Overharvesting and excessive extractive use;
- Management constraints; and
- Inadequate funding to implement needed conservation actions.

To address these threats, the CWCS identifies multiple strategies to implement the following seven priority conservation objectives for the State:

- 1) *Maintain, protect, manage, and restore native species and habitats in sufficient quantity and quality to allow native species to thrive;*
- 2) *Combat invasive species through a three-tiered approach combining prevention and interdiction, early detection and rapid response, and ongoing control or eradication;*
- 3) *Develop and implement programs to obtain, manage, and disseminate information needed to guide conservation management and recovery programs;*
- 4) *Strengthen existing and create new partnerships and cooperative efforts;*
- 5) *Expand and strengthen outreach and education to improve understanding of our native wildlife resources among the people of Hawai‘i;*
- 6) *Support policy changes aimed at improving and protecting native species and habitats; and*
- 7) *Enhance funding opportunities to implement needed conservation actions.*

Successful implementation of the CWCS will require an ongoing effort of local, State, and Federal agencies, non-governmental organizations, private landowners, and individual citizens working together, as has occurred on the strawberry biocontrol project.

The plan references the invasive characteristics of strawberry guava in many contexts. It notes that:

“Montane bog communities are particularly vulnerable to rooting pigs, and feral pigs contribute to the spread of habitat-modifying invasive plants such as strawberry guava (*Psidium cattleianum*) and kāhili ginger (*Hedychium gardnerianum*) in montane wet forest” (p.3-7).

Similar threats by strawberry guava to the lowland wet forest are discussed on page 3-8 of the CWCS. Strawberry guava makes the “short list of [nine] invasive plant species that pose a significant threat to native plant communities and require aggressive management” (p. 4-4).

In a summary of key habitat threats, where invasive plants are discussed, strawberry guava ranks as one of the four plants causing the greatest wildlife habitat degradation (p. 6-44). Accordingly, control of this invasive species, including biocontrol, are a key part of the statewide conservation objectives and strategies. Objective 2 is:

“*Combat invasive species through a three-tiered approach combining prevention and interdiction, early detection and rapid response, and ongoing control or eradication.*”

It is noted that continuous monitoring and responsive management are needed to prevent the establishment of invasive plants, algae, marine invertebrates, predators, parasites and pathogens in priority areas, and to control or remove invasive plant and animal species from areas managed for natural resources protection. One of the “High Priority Strategies” under this objective is:

“Continue to support research on biocontrol (including prescreening to limit unintentional secondary impacts) as one method that addresses priority invasive species.”

Cited specifically as a future need for both the Manuka and Kipahoehoe Natural Area Reserves is biocontrol for, among other species, fountain grass, Christmas berry, and strawberry guava (p. 6-80).

The plan also recognizes that insects used for biocontrol may interact with native insects through predation, competition or disease, hence the need for careful research of each potential biocontrol organism.

PART 4: DETERMINATION

The Hawai'i State Department of Agriculture, upon consideration of comments to the EA, has determined that the proposed action will not significantly alter the environment, and has thus issued a Finding of No Significant Impact (FONSI).

PART 5: FINDINGS AND REASONS

Chapter 11-200-12, Hawai'i Administrative Rules, outlines those factors agencies must consider when determining whether an action has significant effect.

1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resource. The target of the proposed biocontrol action, uncontrolled strawberry guava, is not a natural or cultural resource. Instead, the unnatural condition of lacking any type of predators has allowed it to become invasive to a degree that threatens survival of native forests and the diversity of the ecosystems they host, which are the true natural and cultural resources at risk. The action would help protect existing native forest, watershed and habitat for native plants and animals from invasion by one of Hawai'i's most destructive environmental weeds. Strawberry guava continues to spread rapidly and without the biocontrol program there will be substantial losses to natural and cultural resources.

2) Curtails the range of beneficial uses of the environment.

The proposed action will not curtail beneficial uses of the environment. There will still be abundant fruit and wood (including potential biomass energy) from the enormous existing inventory of strawberry guava trees, which will simply experience a loss of vigor and a reduction in growth and fruiting. Instead, the release of *T. ovatus* is expected to substantially increase long-term beneficial uses of the environment by protecting native forests against degradation by invading strawberry guava and protecting agricultural activities from a major environmental source of non-native pest fruit flies.

3) Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The proposed action is consistent with the environmental policies and guidelines established in Chapter 344, Hawai'i Revised Statutes (HRS) and contributes to the conservation of threatened and endangered species, as covered by Chapter 195D, HRS. It is also consistent with applicable goals of the four counties' General Plans, which include goals and policies for maintaining natural resources. Release of *T. ovatus* for biological control of strawberry guava is consistent with priorities identified in the Hawai'i Comprehensive Wildlife Conservation Strategy (2005), the Recovery Plan for the Big Island Plant Cluster (1996), the Draft Revised Recovery Plan for Hawaiian Forest Birds (2003), and the Three Mountain Alliance Final Management Plan (2007).

4) *Substantially affects the economic or social welfare of the community or state.*

The proposed action will not substantially affect in an adverse way the economic or social welfare of the community or state. It is expected to contribute to the economic and social well-being of local communities and the State through long-term improvement in the health of native forests and reduced impacts of pest fruit flies on Hawaiian agriculture. Healthy native forests offer recreational, cultural and watershed values that contribute to social welfare. It has been suggested by some that impacts to value of private properties could be substantial if the biocontrol agent caused massive strawberry guava dieback or defoliation, inducing scenic impacts and loss of food and wood. In reality, the leaf galls on strawberry guava are effective at limiting growth and fruiting but are only visible from close-up, leaving a still attractive tree. The majority of residents will be unaware that *T. ovatus* is predating individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. In any case, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. For example, the construction of new highways that serve the State's motorists invariable bring increases in noise, impacts to scenic vistas, and minor increases in air pollution. Only when impacts reach significant levels is compensatory mitigation appropriate. Without this principle, the State would be unable to undertake its vital functions, including protection of trust resources such as native forests and the natural and cultural resources they contain.

5) *Substantially affects public health.*

The proposed action is not anticipated to substantially affect public health in any adverse way. Strawberry guava trees will continue to be able to bear fruit, and *T. ovatus* is a scale insect that, like dozens of other such species already in Hawai'i, will not adversely affect people or their health. This insect spends almost all its life attached to a leaf without moving. Females cannot fly or even leave their galls; males are weak fliers that live only about 2 days and have never been known to swarm or bother humans in any way. Direct contact between humans and *T. ovatus* is likely to be minimal because the insects are enclosed within leaf galls most of their lives. Humans near infested strawberry guava may experience chance contact with the eggs, crawlers and waxy filaments which emerge from female galls, but are unlikely to be aware of them because of their small size. The tiny eggs and nymphs are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect. *T. ovatus* cannot bite or sting and are not poisonous. Allergenicity of substances generated by homopterous insects is rare (Wirtz 1984). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. It appears very unlikely that *T. ovatus* poses any risk to human health.

6) *Involves substantial secondary impacts, such as population changes or effects on public facilities.*

No adverse secondary effects are foreseen. Impacts on agriculture, via reduced populations of pest fruit flies, are expected to be highly beneficial. Impacts on public utility rights-of-way are expected to be positive, in that slower growth of strawberry guava is expected to result in lower costs required for weed control under utility lines. Other benefits to public facilities can be expected in the long term, since strawberry guava is expected to lessen in importance as an invasive weed as a result of biocontrol.

7) *Involves a substantial degradation of environmental quality.*

The proposed action does not involve a substantial degradation of environmental quality. Instead, the proposed action is expected to contribute to long-term protection and improvement of environmental quality associated with healthy native forests.

8) *Is individually limited but cumulatively has considerable effect upon environment or involves a commitment for larger actions.*

The proposed release of *T. ovatus* is expected to have direct effects limited to reduced growth and reproduction of strawberry guava, with impacts on this plant developing across the state over a period of decades. There are no other past, present, or reasonably foreseeable actions whose effects would contribute cumulatively to any adverse effects of this action. The proposed action does not involve commitment to larger actions because the impacts of the biocontrol agent are expected to be targeted and gradual.

9) *Substantially affects a rare, threatened or endangered species, or its habitat.*

Release of *T. ovatus* is expected to maintain and gradually improve the habitats of rare, threatened and endangered species that depend on native forest communities. By reducing growth and reproduction of strawberry guava, this action will protect native forests against degradation by invading strawberry guava.

10) *Detrimentially affects air or water quality or ambient noise levels.*

The proposed action will have no detrimental effects on air quality, water quality, or noise levels. Long term benefits to water quality are expected as a result of protecting forest health. There is no evidence that scale insects in any area of the world create air pollution, including the native range of the scale insect on strawberry guava in Brazil. Hawai'i has thousands of species of insects in its forests, including many types of scale insects, and yet there is no evidence of forest insect-related air pollution. There is no reason to believe that *T. ovatus* will produce air pollution.

11) *Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.*

The proposed action is not expected to adversely affect any environmentally sensitive areas, since impacts are expected to be gradual and should improve the stability of forest environments by favoring the persistence of native species over the invasive strawberry guava. The biocontrol agent and affected strawberry guava are not likely to suffer damage associated with

environmentally sensitive areas because the affected forest areas are relatively stable inland environments. Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil-holding species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion. The forests of Hawai'i are important zones of water input that can be adversely affected by factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology. In fact, strawberry guava has been found to reduce recharge to the island aquifers compared to native forest.

12) Substantially affects scenic vistas and view planes identified in county or state plans or studies.

The proposed action is not anticipated to adversely affect any vistas or view planes identified in county or State plans or studies. Although individual plants will develop leaf galls (similar to those found naturally on native plants such as 'ohi'a), the insect and its effects on strawberry guava are not expected to be noticeable to tourists and the general public. The expected impact is not a loss of 25-40% of leaves but rather a reduction in growth (accumulation of height and biomass) of up to 40%. Defoliation would result mainly from an unusual combination of stresses such as prolonged drought, which would also affect most other plants and would be temporary. It is worthwhile to note that 'ohi'a, celebrated for its grace and beauty in Hawaiian songs and chants, exhibits leaf galls produced by a native co-evolved insect without any loss of its general attractiveness or that of its surrounding landscape. It should also be noted that many observers who are appreciative of native species and are concerned about the effects of strawberry guava find the monotypic, uniform foliage of strawberry guava an unattractive symbol of the devastation of the native forest and in fact would rather see native species such as 'ohi'a on roadsides.

13) Requires substantial energy consumption.

The proposed action does not require substantial energy consumption. The biocontrol agent will persist and spread gradually without any human assistance. Strawberry guava does not appear to be a sustainable source of energy because harvesting and transporting it would consume more energy than it would produce, not to mention lead to other environmental problems.

Issue of Uncertainty

Uncertainty regarding the consequence of a subject action requires evaluation as part of an EA. In the case of the proposed project, comments on the Federal EA and at public meetings have expressed concern about uncertainty regarding several aspects of the action, particularly as the results of releasing *T. ovatus* would likely be irreversible.

One concern relates to the possibility that *T. ovatus* would attack non-target plants. Historically, host shifts by introduced weed biological control agents to unrelated plants have been uncommon, and most importantly, highly predictable using standard methods for evaluating host-specificity. Since 1975, when three expert committees started reviewing all applications, host specificity has been 100 percent (Reimer 2002). However, if other plant species were fed upon by *T. ovatus*, the resulting effects could be environmental impacts that may not be easily reversed, and thus the slight possibility that it could move from the target plant (strawberry guava) to use non-target plants must be carefully considered. Host-specificity testing by the U.S. Forest Service and others indicates that, as would be expected with the very close interaction of *T. ovatus* and its host *P. cattleianum*, it is extremely unlikely that *T. ovatus* would use non-target plants. The narrow specificity of *T. ovatus* is also evident in Brazil where the insect is native and exposed to a broad diversity of plants, but only is found on *P. cattleianum* and one very close relative. A shift to a new host plant would require evolution of new traits, a process that might occur over a large interval of time. It should be recognized that the time scale of evolution is very long; at such scales, the thousands of other species of insects in Hawai‘i have an equal opportunity to evolve new characteristics. Among the over 1,100 cases of weed biocontrol worldwide in the last century, rapid host range evolution to use non-target plants has never been documented. The successful history of modern biocontrol in Hawai‘i, in which over 50 biocontrol species (including natural enemies for clidemia, banana poka, and ivy gourd) have been introduced to Hawai‘i without any adverse effects, indicates that such risks are very small.

Another potential uncertainty relates to the degree to which *T. ovatus* will infest strawberry guava, and thus be both effective at controlling it and also severe in its impacts on fruiting and leaf galling. Based on infestations in Brazil, and the history of similar biocontrol projects involving single predators or pathogens, it appears likely that the effort will be moderately effective; i.e., enough galling to reduce fruiting and to slow growth. There is some possibility that *T. ovatus* will not infest to as high a degree or spread as rapidly as expected. If *T. ovatus* is more effective than expected, there will be a greater than expected loss of strawberry guava fruit but also a greater than expected benefit to the native forest, a tradeoff that on balance appears favorable for the trust resources of the State of Hawai‘i.

In summary, there is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low, due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

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ENVIRONMENTAL ASSESSMENT

Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

APPENDIX 1 Information on Host Specificity, Testing and Release Permit Conditions of *T. ovatus*

Index:

PART 1 . Biological control agent information

PART 2. List of plant species tested against *Tectococcus ovatus* at Hawai'i Volcanoes National Park Quarantine

PART 3. Host specificity of *Tectococcus ovatus* in no-choice (starvation) tests at Hawai'i Volcanoes National Park Quarantine Facility, 2002-2005, 2008-2009

PART 4. Host specificity of *Tectococcus ovatus* in choice tests (insects could choose between test plants and *P. cattleianum*) at Hawai'i Volcanoes National Park Quarantine Facility, 1999-2001

PART 5. Results of *Tectococcus ovatus* host specificity testing at the University of Florida, 2003-2005

PART 6. Import Permit Conditions for *Tectococcus ovatus* established by the Hawai'i Department of Agriculture Plant Quarantine Branch in 2007

PART 7. Import Permit Conditions for *Tectococcus ovatus* established by USDA Animal and Plant Health Inspection Service, issued April 4, 2008

APPENDIX 1, Part 1

Biological Control Information

a. Taxonomy

Order: Homoptera Suborder: Sternorrhyncha Superfamily: Coccoidea Family: Eriococcidae
Genus: *Tectococcus* Species: *Tectococcus ovatus* Hempel

b. General description of *T. ovatus*

T. ovatus appears to cause substantial damage to strawberry guava in Brazil. Heavy infestations have been observed to cause defoliation and appear to reduce fruit production (Vitorino et al., 2000). It is also relatively easy to rear which facilitates careful evaluation of its specificity and increases likelihood of successful establishment in the field.

T. ovatus induces circular galls on leaves of strawberry guava. (A gall is an abnormal growth of plant tissues caused by the stimulus of another organism.) Galls up to 8 millimeters in diameter protrude from both sides of the leaf and are usually yellow to red in color. Each gall contains a single developing insect. Female galls are broadly conical, whereas male galls are smaller and narrower. Both have narrow openings at maturity for emergence of offspring or males. Females remain inside galls throughout life and are pink and ovoid with tiny legs. Adult males are pink to gold, have wings and are capable of weak flight.

T. ovatus is the only species in the genus *Tectococcus*. It is sufficiently unique that taxonomic specialists are not likely to confuse it with any other known scale insect species.

c. Geographical range of *T. ovatus* in area of origin

The insect was first collected and described from São Paulo and Ypirauga in Brazil (Hempel 1900). Origins of the insects proposed for environmental release in Hawai'i are from three municipal districts (Piraquara, São José dos Pinhais, and Colombo) in the metropolitan area of Curitiba, Paraná, Brazil (Vitorino et al. 2000).

T. ovatus has been observed to occur naturally in Parana and Santa Catarina states at sea level with mean annual temperatures of 18-22° C, and at approximately 1,000 meters elevation with mean annual temperatures of 15-19 ° C (Vitorino 1995). There is no known evidence that *T. ovatus* has ever been exported outside its natural range previously.

d. Expected range of *T. ovatus* in Hawai'i

Populations of *T. ovatus* have been observed to persist continuously for over ten years in Curitiba, Brazil, where up to 40 mild to moderate frosts occur each winter. Because fluctuations in temperature and humidity are more extreme in subtropical Curitiba than in Hawaiian habitats where strawberry guava occurs (below 1,600 meters), climatic conditions in Hawai'i are not expected to limit the range of *T. ovatus* (Juvik and Juvik 1998).

e. Life history of *T. ovatus*

As with other scale insects, the mobile stage of *T. ovatus* is the newly hatched nymph or crawler. Crawlers typically move to flushing leaves at the tip of a stem and there become immobile, growing as galls form around them. Each female remains enclosed in a gall throughout its life, discharging up to several hundred eggs in a thread-like matrix of wax through a narrow opening. The cottony wax is extremely light and probably serves in dispersal by wind between plants (Vitorino et al., 2000). Reproduction is presumed to be facultatively parthenogenic (females can reproduce without mating with males). Multiple overlapping generations are observed each year in Brazil. Winged males appear at least twice a year (Vitorino et al. 2000). Mating has not been observed.

Under quarantine conditions in Hawai'i, *T. ovatus* reproduces continuously, with a generation time of 6-10 weeks. In two generations, numbers build to a level that causes stunting of small potted plants.

f. Known mortality factors of *T. ovatus*

In Brazil, *T. ovatus* can be heavily attacked by parasitoids (primarily *Metaphycus flavus*, Hymenoptera: Encyrtidae; less often, *Aprostocetus* sp., Hymenoptera: Eulophidae) and a specialist predator (*Hyperaspis delicata*, Coleoptera: Coccinellidae). Although these enemies do not appear to strongly restrict *T. ovatus* population growth or limit impact on the host plant in Brazil (Almeida and Vitorino, 1997; Vitorino et al., 2000), their introduction to Hawai'i could compromise the effectiveness of *T. ovatus* for biocontrol of strawberry guava, and they could negatively impact non-target insects related to *T. ovatus* in the superfamily Coccoidea (relatives of *T. ovatus*), including native and non-native species (Zimmerman 1948). Elimination of hitch-hiking natural enemies is a standard practice in biological control programs (Balciunas and Coombs 2004). Adherence to this practice is expected to prevent introduction of enemies of *T. ovatus* to Hawai'i and is included among the permit conditions for release of *T. ovatus* specified by the Hawai'i Department of Agriculture (see below Part 6). Exclusion of unwanted species is accomplished in quarantine by initiating colonies with only *T. ovatus* eggs and newly hatched first instars, examined under a stereomicroscope, immediately after they emerge from female galls. Two generations of screening in this manner provides a check to guarantee that enemies are excluded.

APPENDIX 1, PART 2.

List of plant species tested against *Tectococcus ovatus* at Hawai'i Volcanoes National Park Quarantine (1999-2005)

Class Subclass Order	Family (Subfamily)	Species	Common names	Native range	Status in Hawai'i	Earliest record in Hawai'i
Magnoliopsida						
Rosidae						
Myrtales	Myrtaceae (Myrtoideae)	<i>Psidium cattleianum</i> Sabine	strawberry guava, waiawi	SE Brazil	invasive	1825
		<i>Psidium guajava</i> L., variety: Puerto Rico #2 Waiakea Allahabad Safeda Fan Retief Ka hua kula Beaumont Thai maroon	common guava	Neotropics	naturalized, cultivated	1840
		<i>Eugenia reinwardtiana</i> (Blume) DC	nioi	Hawai'i	endemic	
		<i>Eugenia uniflora</i> L.	pitanga, Surinam cherry	Brazil	cultivated	1871
		<i>Myrciaria cauliflora</i> (DC.) O. Berg	jaboticaba	S. Brazil	cultivated	
		<i>Syzygium cumini</i> (L.) Skeels	Java plum, jambolan plum	India, Ceylon, Malesia	naturalized	1871
		<i>Syzygium jambos</i> (L.) Alston	rose apple	Malesia, SE Asia	naturalized	1825
		<i>Syzygium malaccense</i> (L.) Merr. & Perry	mountain apple	Malesia, SE Asia	naturalized, Polynesian introduction	
		<i>Rhodomyrtus tomentosa</i> (Aiton) Hassk.	downy myrtle, rose myrtle	India, SE Asia, Phillipines	naturalized	1920
	Myrtaceae (Leptospermoideae)	<i>Callistemon citrinus</i> (Curtis) Stapf	crimson bottlebrush	Australia	horticultural	
		<i>Eucalyptus citriodora</i> Hook.	lemon-scented gum	Australia	naturalized, widespread plantings	1921
		<i>Eucalyptus globulus</i> Labill.	blue gum	Australia	naturalized, extensive plantations	1871

APPENDIX 1, PART 2, continued

Class Subclass Order	Family (Subfamily)	Species	Common names	Native range	Status in Hawai'i	Earliest record in Hawai'i
	Myrtaceae (Leptospermoideae)	<i>Lophostemon confertus</i> (R. Br.) Peter G. Wilson & Waterhouse	vinegar tree	Australia	forest plantings, recently naturalized	1929
		<i>Melaleuca quinquenervia</i> (Cav.) S.T. Blake	paperbark	Australia, New Guinea	naturalized, extensive forest plots	1920
		<i>Metrosideros macropus</i> Hook. & Arnott	ohia lehua	Hawai'i	endemic	
		<i>Metrosideros polymorpha</i> Gaud.	ohia lehua	Hawai'i	indigenous	
		<i>Metrosideros rugosa</i> A. Gray	lehua papa	Hawai'i	endemic	
		<i>Metrosideros tremuloides</i> (A. Heller) P. Knuth	lehua ahihi	Hawai'i	endemic	
	Lythraceae	<i>Cuphea hyssopifolia</i> Kunth	false heather	Mexico- Honduras	naturalized in disturbed sites, streambeds	1909
		<i>Cuphea ignea</i> A. DC	cigar flower	Mexico	horticultural, naturalized	1871
		<i>Lythrum maritimum</i> Kunth	pukamole	Peru, Hawai'i	indigenous	
	Thymelaeaceae	<i>Wikstroemia sandwicensis</i> Meisn.	akia	Hawai'i	endemic	
		<i>Wikstroemia uva-ursi</i> A. Gray	akia	Hawai'i	endemic	
Fabales	Fabaceae	<i>Acacia koa</i> A. Gray	koa	Hawai'i	endemic	
		<i>Sophora chrysophylla</i> (Salisb.) Seem.	mamane	Hawai'i	endemic	
Sapindales	Anacardiaceae	<i>Rhus sandwicensis</i> A. Gray	neneleau	Hawai'i	endemic	
	Sapindaceae	<i>Dimocarpus longan</i> Lour	longan	India	cultivated	
		<i>Dodonaea viscosa</i> Jacq.	a'ali'i	Pantropical	indigenous	
		<i>Nephelium lappaceum</i> L.	rambutan	Malaysia	cultivated	
Lamiales	Myoporaceae	<i>Myoporum sandwicense</i> A. Gray	naio	Cook Islands, Hawai'i	indigenous	
Rubiales	Rubiaceae	<i>Coprosma rhynchocarpa</i> A. Gray	pilo	Hawai'i	endemic	
Filicopsida Polypodiales	Dicksoniaceae	<i>Cibotium glaucum</i> (Sm.) Hook. & Arnott	hapu'u pulu	Hawai'i	endemic	

APPENDIX 1, Part 3.

Host specificity of *Tectococcus ovatus* in no-choice (starvation) tests at Hawai'i Volcanoes National Park Quarantine Facility, 2002-2005, 2008-2009

Family (Subfamily)	Test plant species	Common names	No. of replicates	Total no. galls initiated	% Survival of nymphs ^a
Myrtaceae (Myrtoideae)	<i>Psidium cattleianum</i>	strawberry guava	37	383	44±13
	<i>Psidium guajava</i> L. variety: Puerto Rico #2	common guava	2	0	0
	Waiakea		4	0	0
	Allahabad Safeda		2	0	0
	Fan Retief		2	0	0
	Ka hua kula		4	0	0
	Beaumont		2	0	0
	Thai maroon		3	0	0
	<i>Eugenia brasiliensis</i>	grumichama	2	0	0
	<i>Eugenia reinwardtiana</i>	nioi	3	0	0
	<i>Eugenia uniflora</i>	pitanga, Surinam cherry	5	0	0
	<i>Myrciaria cauliflora</i>	jaboticaba	5	0	0
	<i>Feijoa sellowiana</i>	pineapple guava	1	0	0
	<i>Syzygium cumini</i>	Java or jambolan plum	5	0	0
	<i>Syzygium jambos</i>	rose apple	6	0	0
	<i>Syzygium malaccense</i>	mountain apple	5	0	0
	<i>Rhodomyrtus tomentosa</i>	downy or rose myrtle	6	0	0
Myrtaceae (Leptospermoideae)	<i>Callistemon citrinus</i>	crimson bottlebrush	5	0	0
	<i>Eucalyptus citriodora</i>	lemon-scented gum	2	0	0
	<i>Eucalyptus globulus</i>	blue gum	5	0	0
	<i>Melaleuca quinquenervia</i>	paperbark	5	0	0
	<i>Metrosideros macropus</i>	ohia lehua	5	0	0
	<i>Metrosideros polymorpha</i>	ohia lehua	6	0	0
	<i>Metrosideros rugosa</i>	lehua papa	2	0	0
	<i>Metrosideros tremuloides</i>	lehua ahihi	2	0	0
Lythraceae	<i>Cuphea ignea</i>	cigar flower	1	0	0
	<i>Lythrum maritimum</i>	pukamole	2	0	0
Thymelaeaceae	<i>Wikstroemia sandwicensis</i>	akia	5	0	0
	<i>Wikstroemia uva-ursi</i>	akia	2	0	0
Brassicaceae	<i>Brassica oleracea</i>	kale	1	0	0
	<i>Brassica rapa chinensis</i>	bok choi	1	0	0
Caricaceae	<i>Carica papaya</i>	papaya	1	0	0
Malvaceae	<i>Theobroma cacao</i>	cacao	1	0	0
Sapindaceae	<i>Dodonaea viscosa</i>	a'ali'i	4	0	0
	<i>Litchi chinensis</i>	lychee	3	0	0
Cucurbitaceae	<i>Cucumis sativus</i>	Japanese cucumber	1	0	0
Moraceae	<i>Artocarpus altilis</i>	breadfruit	1	0	0
Fabaceae	<i>Acacia koa</i>	koa	3	0	0
	<i>Sophora chrysophylla</i>	mamane	4	0	0
	<i>Phaseolus vulgaris</i>	green beans	2	0	0
Proteaceae	<i>Macadamia ternifolia</i>	macadamia	2	0	0

Family (Subfamily)	Test plant species	Common names	No. of replicates	Total no. galls initiated	% Survival of nymphs ^a
Apiaceae	<i>Petroselinum crispum</i>	American parsley	2	0	0
Asteraceae	<i>Lactuca sativa</i>	manoa lettuce	1	0	0
Lamiaceae	<i>Ocimum basilicum</i>	green basil	2	0	0
Myoporaceae	<i>Myoporum sandwicense</i>	naio	4	0	0
Convolvulaceae	<i>Ipomoea batatas</i>	sweet potato	3	0	0
Rubiaceae	<i>Coffea arabica</i>	coffee	4	0	0
Lauraceae	<i>Persea americana</i>	avocado	3	0	0
Bromeliaceae	<i>Ananas comosus</i>	pineapple	1	0	0
Alliaceae	<i>Allium schoenoprasum</i>	chives	2	0	0
Araceae	<i>Colocasia esculenta</i>	taro (maui lehua)	1	0	0
Dicksoniaceae	<i>Cibotium glaucum</i>	hapu'u pulu	4	0	0

^aMean \pm standard deviation.

APPENDIX 1, Part 4

Host specificity of *Tectococcus ovatus* in choice tests (insects could choose between test plants and *P. cattleianum*) at Hawai'i Volcanoes National Park Quarantine Facility, 1999-2001

Family (Subfamily)	Test plant species	Common names	No. of replicates	No. galls initiated on test plants	No. galls initiated on <i>P. cattleianum</i>
Myrtaceae (Myrtoideae)	<i>Psidium guajava</i> L.	common guava			
	Variety: Waiakea		3	0	20,17,27
	Ka hua kula		3	0	20,17,18
	Beaumont		5	0	20,18,6,55,32
	<i>Syzygium jambos</i>	rose apple	2	0	5,21
	<i>Syzygium malaccense</i>	mountain apple lemon-scented	2	0	10,9
Myrtaceae (Leptospermoideae)	<i>Eucalyptus citriodora</i>	gum	2	0	6,8
	<i>Eucalyptus globulus</i>	blue gum	2	0	9,9
	<i>Lophostemon confertus</i>	vinegar tree	2	0	10,90
	<i>Melaleuca quinquenervia</i>	paperbark	2	0	10,5
	<i>Metrosideros macropus</i>	ohia lehua	2	0	39,20
	<i>Metrosideros polymorpha</i>	ohia lehua	4	0	50,100,16,86
Lythraceae	<i>Cuphea hyssopifolia</i>	false heather	2	0	34,14
	<i>Cuphea ignea</i>	cigar flower	3	0	7,33,27
	<i>Lythrum maritimum</i>	pukamole	2	0	7,9
Thymelaeaceae	<i>Wikstroemia sandwicensis</i>	akia	2	0	9,16
Fabaceae	<i>Acacia koa</i>	koa	3	0	100,6,47
	<i>Sophora chrysophylla</i>	mamane	3	0	100,10,23
Anacardiaceae	<i>Rhus sandwicensis</i>	neleau	1	0	5
Sapindaceae	<i>Dimocarpus longan</i>	longan	3	0	7,8,30
	<i>Dodonaea viscosa</i>	a'ali'i	2	0	8,83
	<i>Nephelium lappaceum</i>	rambutan	3	0	7,8,30
Myoporaceae	<i>Myoporum sandwicense</i>	naio	2	0	85,11
Rubiaceae	<i>Coprosma rhynchocarpa</i>	pilo	2	0	20,44
Dicksoniaceae	<i>Cibotium glaucum</i>	hapu'u pulu	2	0	34,12

APPENDIX 1, Part 5. Results of *Tectococcus ovatus* host specificity testing at the University of Florida, 2003-2005

<i>Test Plant</i>	<i>Family</i>	<i>Gall development</i>	<i>Replications</i>
<i>Psidium cattleianum</i> var. <i>lucidum</i> Sabine	Myrtaceae	+	50
<i>Psidium cattleianum</i> var. <i>cattleianum</i> Sabine	Myrtaceae	+	3
<i>Psidium friedrichsthalianum</i> O. Berg	Myrtaceae	- ^a	3
<i>Psidium guineense</i> Sw.	Myrtaceae	+ ^b	3
<i>Psidium guajava</i> L.	Myrtaceae	-	3
<i>Acca sellowiana</i> (O. Berg) Burret	Myrtaceae	-	3
<i>Eugenia axillaris</i> (Sw.) Willd.	Myrtaceae	-	3
<i>Eugenia foetida</i> Pers.	Myrtaceae	-	3
<i>Eugenia uniflora</i> L.	Myrtaceae	-	3
<i>Myrciaria cauliflora</i> (C. Martius) O. Berg	Myrtaceae	-	3
<i>Pimenta dioica</i> (L.) Merr.	Myrtaceae	-	3
<i>Pimenta racemosa</i> (P. Mill.) J.W. Moore	Myrtaceae	-	3
<i>Syzygium malaccense</i> (L.) Merr. & Perry	Myrtaceae	-	3
<i>Syzygium paniculatum</i> Gaertner	Myrtaceae	-	3
<i>Callistemon citrinus</i> (Curtis) Staph	Myrtaceae	-	3
<i>Callistemon viminalis</i> (Gaertn.) G. Don ex Loudon	Myrtaceae	-	3
<i>Eucalyptus camaldulensis</i> Dehnhardt	Myrtaceae	-	3
<i>Leptospermum scoparium</i> J.R. & G. Forst.	Myrtaceae	-	3
<i>Melaleuca quinquenervia</i> (Cav.) Blake	Myrtaceae	-	3
<i>Calyptrothrix pallens</i> Griseb.	Myrtaceae	-	3
<i>Calyptrothrix zuzygium</i> (L.) Sw.	Myrtaceae	-	3
<i>Eugenia confusa</i> DC.	Myrtaceae	-	3
<i>Eugenia rhombea</i> Krug & Urban	Myrtaceae	-	3
<i>Mosiera longipes</i> (Berg) McVaugh	Myrtaceae	-	3
<i>Myrcianthes fragrans</i> (Sw.) McVaugh	Myrtaceae	-	3
<i>Ammannia coccinea</i> Rottb.	Lythraceae	-	3
<i>Cuphea hyssopifolia</i> Kunth	Lythraceae	-	3
<i>Cuphea micropetala</i> Humb., Bonpl. & Kunth	Lythraceae	-	3
<i>Decodon verticillatus</i> (L.) Ell.	Lythraceae	-	3
<i>Lagerstroemia indica</i> L.	Lythraceae	-	3
<i>Lythrum alatum</i> Pursh	Lythraceae	-	3
<i>Rhexia lutea</i> Walt.	Melastomataceae	-	2
<i>Rhexia mariana</i> L.	Melastomataceae	-	3

“+” indicates feeding damage and gall development; “-” indicates a lack of feeding damage and gall development (Wessels et al. 2007).

APPENDIX 1, Part 5, continued

<i>Test Plant</i>	<i>Family</i>	<i>Results</i>	<i>Replications</i>
<i>Rhexia nashii</i> Small	Melastomataceae	-	3
<i>Tetrazygia bicolor</i> (P. Mill.) Cogn.	Melastomataceae	-	3
<i>Rollinia mucosa</i> (Jacq.) Baill.	Annonaceae	-	3
<i>Punica granatum</i> L.	Punicaceae	-	2
<i>Conocarpus erectus</i> L.	Combretaceae	-	3
<i>Chrysobalanus icaco</i> L.	Chrysobalanaceae	-	3
<i>Nyssa sylvatica</i> var. <i>biflora</i> Walt.	Nyssaceae	-	3
<i>Daphnopsis americana</i> (P. Mill.) J.R.	Thymelaeaceae	-	3
<i>Ilex cassine</i> L.	Aquifoliaceae	-	3
<i>Ilex x attenuata</i> Ashe	Aquifoliaceae	-	3
<i>Delonix regia</i> (Bojer ex Hook) Raf.	Fabaceae	-	3
<i>Quercus hemisphaerica</i> Bartr. ex Willd.	Fagaceae	-	3
<i>Persea americana</i> P. Mill.	Lauraceae	-	3
<i>Ficus aurea</i> Nutt.	Moraceae	-	3
<i>Myrica cerifera</i> (L.) Small	Myricaceae	-	3
<i>Saccharum officinarum</i> L.	Poaceae	-	3
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Rosaceae	-	3
<i>Prunus angustifolia</i> Marsh.	Rosaceae	-	3
<i>Prunus persica</i> (L.) Batsch	Rosaceae	-	3
<i>Pyrus x lecontei</i> 'Hood'	Rosaceae	-	3
<i>Citrus limon</i> (K.) Burm. F.	Rutaceae	-	3
<i>Citrus x paradisi</i> Macfad.	Rutaceae	-	3
<i>Citrus sinensis</i> (L.) Osbeck	Rutaceae	-	3
<i>Taxodium distichum</i> (L.) L.C.	Cupressaceae	-	3
<i>Pinus elliottii</i> Engelm.	Pinaceae	-	3
<i>Podocarpus macrophyllus</i> (Thunb.) Sweet	Podocarpaceae	-	3

^a *T. ovatus* survived longer than the 2 week test period; test was extended to 4 weeks, but no damage or gall formation was observed.

^b *T. ovatus* survived longer than the 2 week test period; test was extended to 4 weeks, weak leaf gall formation was observed.

**APPENDIX 1, Part 6. Import Permit Conditions for *Tectococcus ovatus*
established by the Hawai'i Department of Agriculture Plant Quarantine Branch
in 2007**

1. The restricted article(s), *Tectococcus ovatus*, shall be used for field release as authorized by the Plant Quarantine Branch (PQB).
2. The permittee(s), Dr. M. Tracy Johnson, shall be responsible and accountable for all restricted article(s) imported, from the time of their arrival to their disposition.
3. The restricted article(s) shall be safeguarded at the Permittee(s)' facility located at the Quarantine Facility, Hawai'i Volcanoes National Park, which has been inspected and approved by the PQB prior to importation.
4. The permittee(s) shall submit samples of the restricted article prior to importation to the PQB, which will be placed in the Hawai'i Department of Agriculture Insect Quarantine Facility of the Hawai'i Volcanoes National Park Quarantine Facility for screening for other species, predators, parasites, parasitoids or hyperparasitoids for a minimum of two generations. A report shall be submitted to PQB of any organisms found other than the restricted article(s).
5. All parcels containing the restricted article(s) that are imported into the State shall be clearly marked: "May be opened and delayed for agricultural inspection in Hawai'i".
6. An invoice, bill of lading, or other document shall accompany each shipment listing the scientific name and quantity of each restricted article(s) imported.
7. All parcels containing the restricted article(s) shall be subject to inspection by the PQB prior to entering the State and shall be imported through an approved port-of-entry as designated by the Board of Agriculture.
8. The imported restricted article(s) and the permittee(s)' facility shall be made available for inspection by the PQB or other designated Hawai'i Department of Agriculture employee(s).
9. The permittee(s) shall submit a report to the PQB on results of post-release monitoring programs on a semi-annual basis.
10. The permittee(s) shall immediately report any theft, accidental release, or disease outbreaks involving the restricted article(s) to the PQB at (808) 832-0566.
11. The permit is subject to revocation and all restricted article(s) and materials that came into contact with the organism may be subject to confiscation should any of the restricted article(s) or infected materials be removed from the approved facilities without authorization from the PQB prior to removal.

12. The permit is subject to cancellation for violation of permit conditions upon written notification from the PQB. A canceled permit is invalid and all article(s) listed on the permit shall not be imported.

13. The permittee(s) shall agree in advance to defend and indemnify the State of Hawai'i, its officers, agents and employees for any and all claims against the State of Hawai'i, its officers, agents, or employees that may arise from or be attributable to any of the restricted article(s) that are introduced under this permit. This permit condition shall not apply to a permittee that is a federal or State of Hawai'i entity or employee, provided that the State or federal employee is a permittee in the employee's official capacity.

14. This permit or conditions of this permit are subject to cancellation or amendment at any time due to changes in administrative rules restricting or disallowing import of the restricted article(s) or due to Board of Agriculture action disallowing a previously permitted use of the restricted article(s).

APPENDIX 1, Part 7
Permit Conditions for Environmental Release of *Tectococcus ovatus* established
by USDA Animal and Plant Health Inspection Service,
issued April 4, 2008

This permit is issued to Dr. Matthew Johnson, USDA Forest Service, Hawaii Volcanoes National Park Quarantine Facility, and authorizes the movement of the biological control organism, *Tectococcus ovatus*, from quarantine and also authorizes environmental release in Hawaii.

1. Plant feeding biocontrol agents and natural enemies of plant pests are regulated by USDA under the authority of the Plant Protection Act of 2000. This permit authorizes the interstate movement of organisms listed on the PPQ Form 526 (henceforth referred to as approved organisms) to the designated state for release into the environment.
2. Approved organisms are to be shipped in sturdy escape-proof containers.
3. No seeds or propagative host plant parts are to be included in the shipments of approved organisms.
4. All host material accompanying approved organisms in shipments must be destroyed or sterilized prior to disposal.
5. This permit does not relieve the permittee of the obligation to comply with regulations of other state and Federal agencies.
6. Issuance of this permit constitutes neither a certification nor an endorsement by USDA/APHIS of the quality, efficacy or any other potential product claim related to the commercial value or effectiveness of products derived from issuing this permit.
7. Permittee moving field collected organisms must take all precautions to prevent shipping of unidentified species and diseased or parasitized individuals to prevent the movement of contaminant organisms.

ENVIRONMENTAL ASSESSMENT

Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

APPENDIX 2

Cost Estimates for Manual/Herbicide Control of Strawberry Guava

Estimating the Cost of Controlling Strawberry Guava in East Hawaii Conservation Areas

Assumptions

- Labor costs are estimated at \$15 per hour plus benefits for \$200 per worker day
- Based on consultation with resource managers experienced in control of forest weeds (including Strawberry Guava), we conservatively estimate dense infestations to take about 50 worker days per acre and incipient invasions (scattered trees) to take about one worker day per acre
- Control methods include cutting all stems of Strawberry Guava and applying herbicide to prevent resprouting. Control of the numerous seedlings and any subsequent growth would occur during a secondary sweep of each control area.
- Because only a few areas are easily accessible by road, we considered extra costs associated with work in more remote areas. Away from roads, workers would need to carry equipment through dense vegetation and over rugged terrain. Areas more than 0.5 km (0.3 miles) require extra time for work crews to access and therefore a higher cost per acre. Areas more than 2.5 km (1.5 miles) are too remote to work on a day by day basis (too much time would be spent getting to and from access points along roads); therefore these areas would require work crews to camp and would likely involve helicopter transport for equipment and camping gear.
- Costs were broken down according to the severity of the infestation and the distance from roads (see Tables 1 and 2). Maps of these attributes were combined in a Geographic Information System (GIS) in order to determine how much area has a given combination of characteristics (see Maps 1 through 4).

Estimated Costs

Incipient Invasions

Near roads: 31,600 acres × \$250/acre = \$7,900,000

Moderate Distance: 86,800 acres × \$284/acre = \$24,651,000

Remote: 61,300 acres × \$506/acre = \$31,018,000

Dense Infestations

Near roads: 9,200 acres × \$10,500/acre = \$96,000,000

Moderate Distance: 11,900 acres × \$12,200/acre = \$145,180,000

Remote: 2,700 acres × \$23,315/acre = \$62,950,000

Total Cost: \$367,700,000

Additional Considerations

- While removal of Strawberry Guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter which would add far more cost than any potential value gained.
- Building of additional roads for access is not considered feasible due to added costs and the legal limitations of road construction in areas zoned for conservation or designated as endangered species habitat.
- Because Strawberry Guava produces numerous seeds, a secondary sweep (after perhaps 3-4 years) of each treated area would be necessary to control seedlings. This would likely incur a cost similar to that for incipient invasion across the entire region (estimated at about \$70,000,000 total for the secondary sweep). Continued dispersal from non-controlled areas may require additional sweeps near the boundaries of controlled areas, adding an unknown cost.

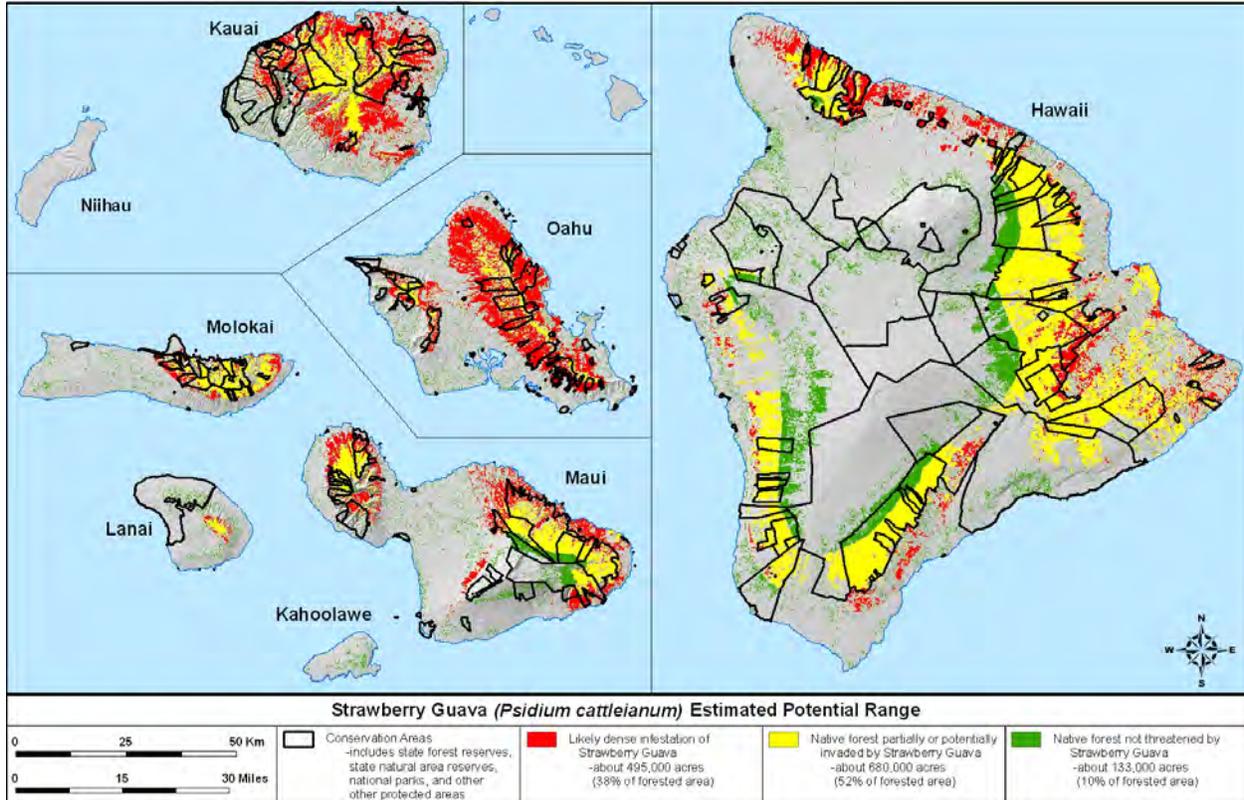
Table 1. Cost per Acre for Control of Incipient Invasion

	Labor	Equipment	Additional	Total
Close to roads (within 0.3 mi or 0.5 km)	1 worker day × \$200/day = \$200	\$50	0	\$250
Walking distance from roads (.5-2.5 km or 0.3-1.5 mi)	1.17 worker days × \$200/day = \$234	\$50	0	\$284
Remote/Helicopter >2.5 km/1.5 mi	1.46 worker days × \$200/day = \$292	\$50	\$164	\$506

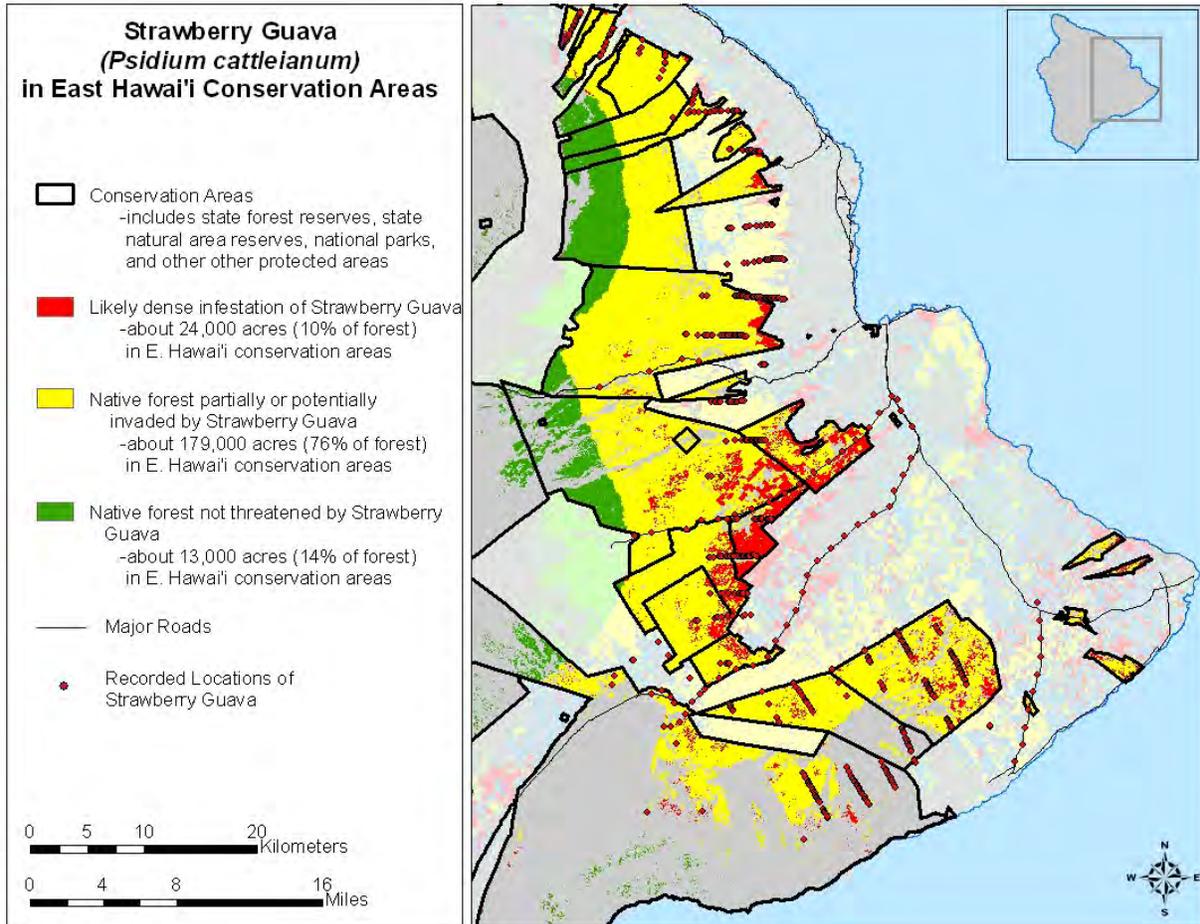
Table 2. Cost per Acre for Control of Dense Infestation

	Labor	Equipment	Additional	Total
Close to roads (within 0.3 mi or 0.5 km)	50 worker days × \$200/day = \$10,000	\$500	0	\$10,500
Walking distance from (.5-2.5 km or 0.3-1.5 mi)	58.5 worker days × \$200/day = \$11,700	\$500	0	\$12,200
Remote/Helicopter >2.5 km/1.5 mi	73.1 worker days × \$200/day = \$14,625	\$500	\$8,190	\$23,315

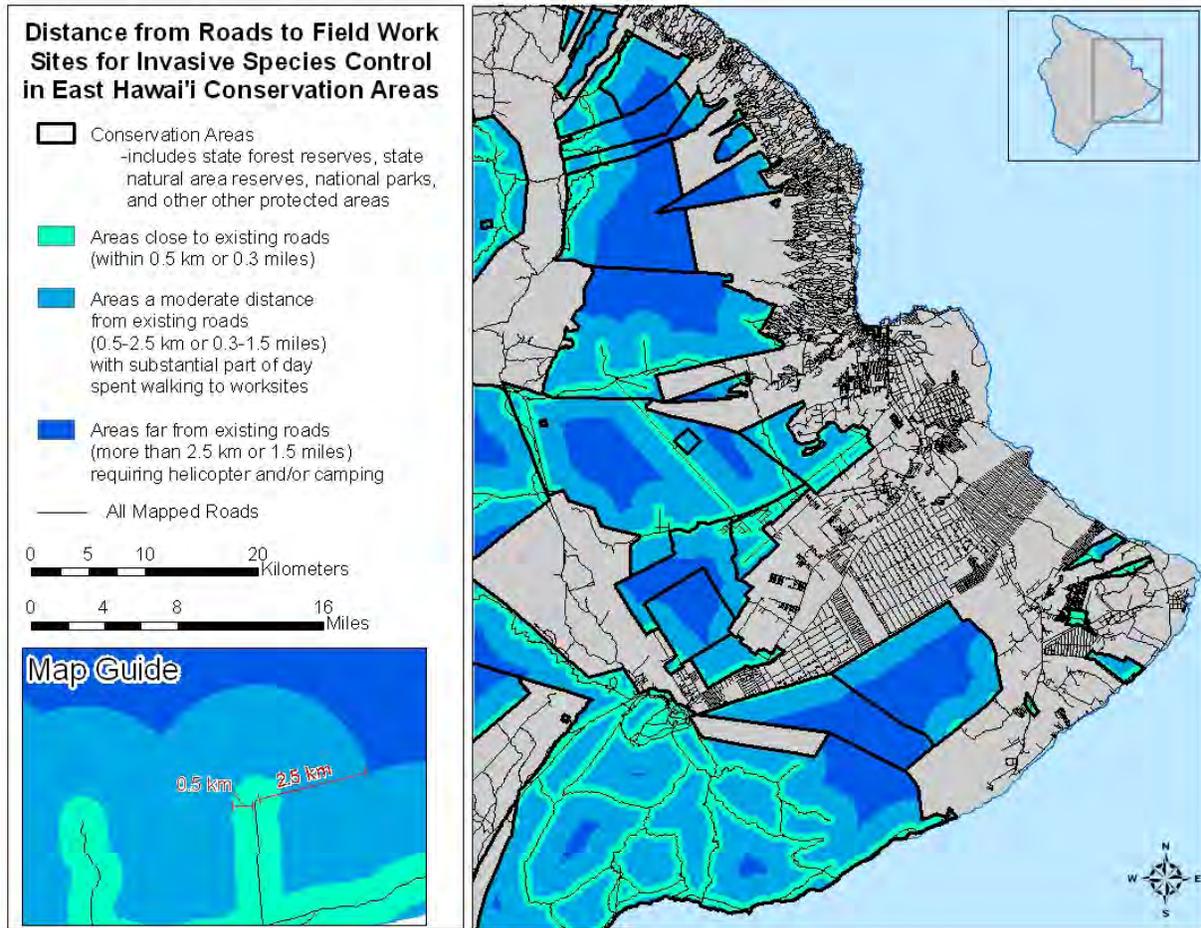
Map 1. Strawberry Guava Habitat across the State. Native Forests and dense infestations of Strawberry Guava were mapped using satellite imagery (from the HIGAP project). The areas either partially or potentially invaded by Strawberry Guava were estimated based on rainfall (areas receiving >1000 mm or 40 inches), elevation (areas below 1,500 m or 5,000 feet and lava flow age (young lava flows excluded).



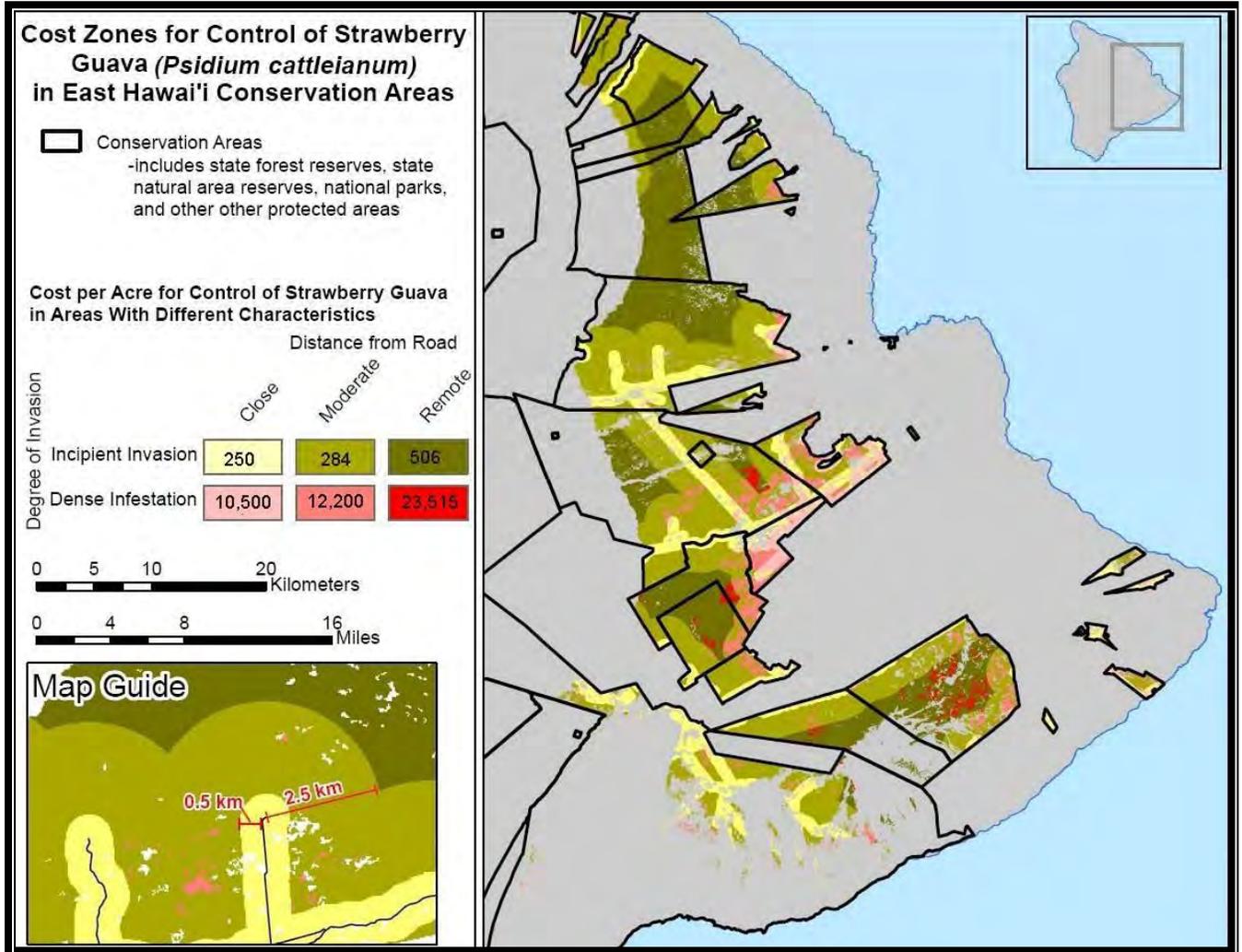
Map 2. Strawberry Guava in East Hawaii Conservation Areas. Dense infestations were mapped using satellite imagery. Recorded locations include extensive fieldwork and indicate areas where the species occurs but was not visible in satellite imagery (these are not the only places the species occurs, but those that have a precise location recorded). The areas either partially or potentially invaded by Strawberry Guava were estimated based on rainfall, elevation and lava flow age.



Map 2. Distance from Roads in East Hawaii Conservation Areas. A Geographic Information System (GIS) was used to calculate the distance from each given location to the nearest road.



Map 3. Cost Zones for Control of Strawberry Guava within East Hawaii Conservation Areas. Control cost is a function of both the severity of infestation and the distance from the nearest road. Costs given in the legend reflect estimates outlined in Tables 1 and 2.



ENVIRONMENTAL ASSESSMENT

Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

APPENDIX 3 Cultural Impact Assessment

Cultural Impact Assessment of the Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands



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ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

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INTRODUCTION

At the request of Ron Terry, Ph.D. of Geometrician Associates, LLC, Rechtman Consulting, LLC with the assistance of Dr. Terry and Frances Kinslow of the U.S. Forest Service, prepared this Cultural Impact Assessment (CIA) for the proposed release of a biocontrol agent (*Tectococcus ovatus*) to combat the spread of the highly invasive strawberry guava (*Psidium cattleianum*) in order to help preserve native forests in Hawai‘i. Unlike many other projects, which may directly affect only limited areas that can be measured and described systematically, the proposed biocontrol of strawberry guava would eventually affect all areas where strawberry guava occurs in the Hawaiian Islands, particularly locations where it occurs in the wild with some abundance. Figure 1 shows the distribution of strawberry guava around the State of Hawai‘i. Strawberry guava does not occur on Kaho‘olawe or Ni‘ihau, but does occur extensively on all other main islands. Strawberry guava, a native of Brazil, was introduced to Hawai‘i in 1825 as an ornamental fruit tree. In its native Brazil, strawberry guava is kept in check by naturally occurring insect species, including the scale insect *Tectococcus ovatus*. In Hawai‘i, without a natural relationship with this insect, strawberry guava grows and spreads quickly, creating thickets where nothing else can survive. This uncontrolled growth is what makes strawberry guava one of the most widespread threats to Hawaiian native forest species (both plant and animal) as well as a potential threat to cultural practices and archaeological sites.

With a roughly 180 year history in the state, strawberry guava is also consumed by many residents, either fresh, or occasionally as juice or in jellies. There are minor economic uses as well, but its economic value is outweighed by the severe impacts it has on native forests, and strawberry guava in the wild is also a host for fruit flies which have a significant negative impact on Hawai‘i's commercial agriculture. The wood, fruit, and leaves of this species are used for various activities and products, both modern and ancient in origin. In this latter category, the typically hard straight trunk and branches of strawberry guava have been used as a substitute wood in the manufacture of *hula* and *lua* implements when native species cannot be obtained. However, some cultural practitioners feel that substituting an introduced species for the traditionally used native species diminishes the power and essence of the implements. As Sam Gon explains:

As a conservation biologist, and a Hawaiian cultural practitioner, it breaks my heart to see these dark thickets of strawberry guava crowding out the native trees and plants that should be growing here....Strawberry guava has been in Hawai‘i so long and is so common in our forests that some people make use of it as a resource. Its wood can be used for *hula* implements and tools, and its fruits are edible. But as a Hawaiian cultural practitioner, I think strawberry guava is a sorry substitute for what we should be using for our implements and tools. We should be using our native trees: ‘*ohi‘a*, *alahe‘e*, *lama*, *olopua*, and dozens of other species that are being destroyed by a single foreign species [Strawberry Guava]. (Samuel Gon, transcribed from video interview, 2009)

The current study is intended to accompany an Environmental Assessment (EA) compliant with Chapter 343 HRS. The EA evaluates two alternatives: one of action, the release of a biocontrol agent into the environment; and one of no action, the continuation of currently used control activities, which are limited to chopping and bulldozing (manual or mechanical control) and treatment with herbicides (chemical control). The current CIA assesses the potential cultural impacts from the implementation of each of these alternatives.

This study has been prepared pursuant to Act 50, approved by the Governor on April 26, 2000; and in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawai‘i, on November 19, 1997; and was performed in consideration of both federal and state guidelines, among which are the Advisory Council on Historic Preservation’s “Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review” (ACHP 1985); National Register Bulletin 38, “Guidelines for Evaluating and Documenting Traditional Cultural Properties” (Parker and King 1990); the Hawai‘i State Historic

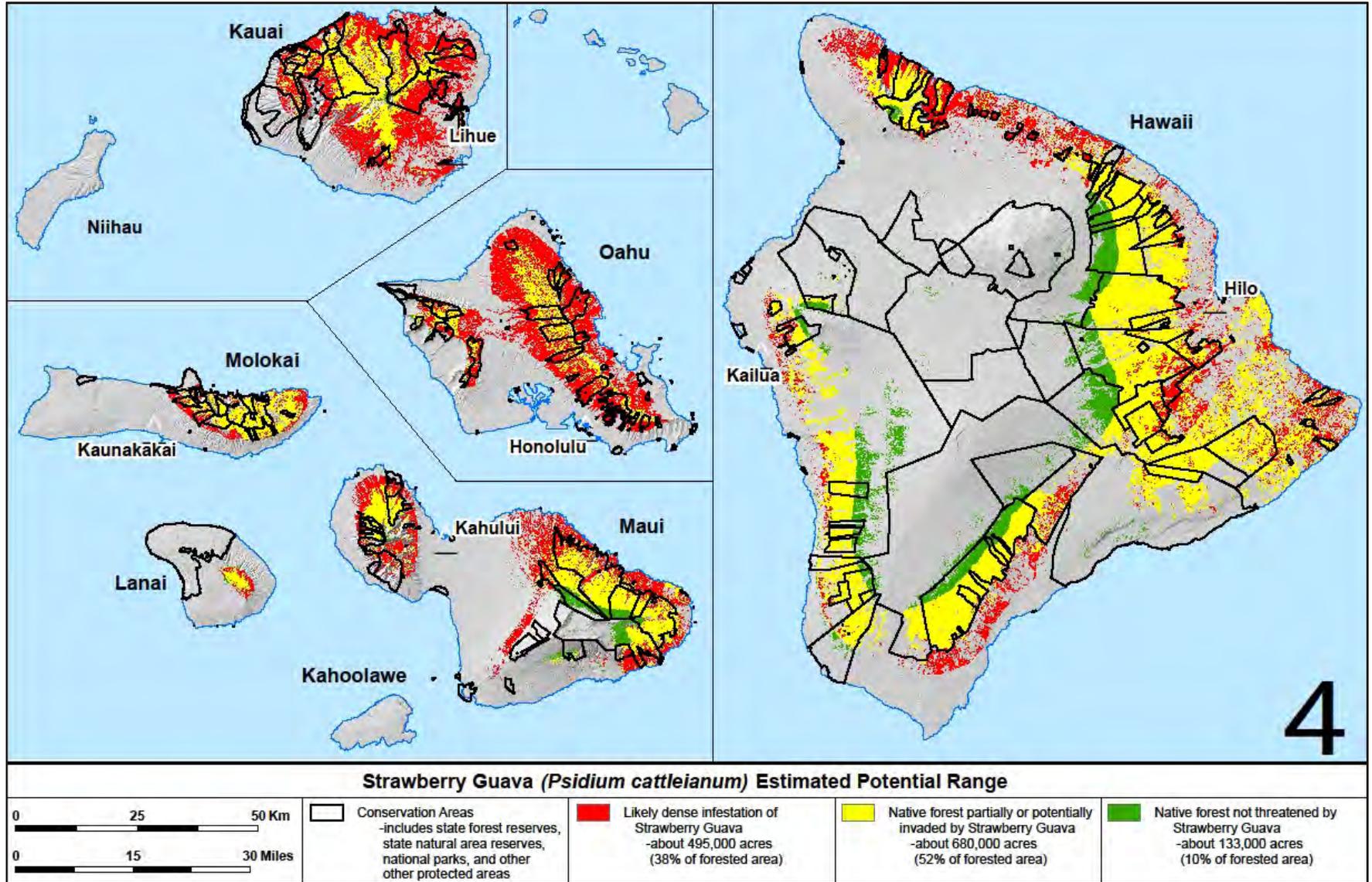


Figure 1. General statewide distribution of strawberry guava.

Preservation Statute (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of on-going cultural significance; the criteria, standards, and guidelines currently utilized by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) for the evaluation and documentation of cultural sites (cf. 13§13-275-8; 276-5); and the November 1997 guidelines for cultural impact assessment studies, adopted by the Office of Environmental Quality Control (OEQC).

Below is a description of the alternatives evaluated in the EA, brief natural and cultural historical backgrounds, and the results of consultations with cultural practitioners. Combined, this information provides the context in which to identify potential cultural properties or practices that may be associated with strawberry guava. This is followed by a discussion of potential impacts and suggested appropriate actions and strategies to mitigate any potential impacts.

PROPOSED ENVIRONMENTAL ALTERNATIVES: ACTION AND NO ACTION

Action

Under the action alternative, the scale insect *Tectococcus ovatus* will be released into the environment. The initial release of this biocontrol agent is proposed for the Ola‘a Forest Reserve on the Island of Hawai‘i (Figure 2). Through natural dispersal and eventual redistribution of the insect by state and federal agencies, it is expected that the range of *Tectococcus ovatus* will extend statewide. This scale insect is expected to only target strawberry guava, and would cause leaf galls that reduce the vigor of the plant and fruiting. Research and testing show that the scale insect is very host specific and will only target strawberry guava. Both in Brazil and in laboratory tests, the scale insect does not move from strawberry guava to other plants such as ‘ohi‘a lehua, common guava, and other native and agricultural plants in Hawaii. On strawberry guava, the scale insect will cause leaf galls that do not kill trees but reduce their vigor and fruiting, slowing the growth and the spread of the tree in Hawaii. Expected impacts include a 25-50 percent reduction in vegetative growth rate and 60-90 percent reduction in fruit and seed production, similar to levels seen in its native Brazil. The natural presence of *Tectococcus ovatus* on strawberry guava in Brazil does not reduce the usefulness of either its fruit or wood. The dominant tree of native wet forests in Hawai‘i, ‘ōhi‘a lehua (*Metrosideros polymorpha*), has a native, co-evolved insect that similarly produces leaf galls and reduces plant vigor, without impairing the beauty and utility of this tree. The effects of *Tectococcus ovatus* on strawberry guava are expected to occur gradually over a period of decades, providing long-term control, allowing natural substitution of strawberry guava by other plant species, and preventing spread of strawberry guava into areas at risk from invasion. There is however, some uncertainty in how effectively *Tectococcus ovatus* will control strawberry guava in Hawai‘i. While observations in Brazil and laboratory tests indicate that this agent can significantly impact individual strawberry guava plants, its full effectiveness for protecting remaining Hawaiian forests from the continuous spread of strawberry guava will not be known until after release occurs and post-release monitoring has been conducted.

No Action

Under the no action alternative, the chemical and mechanical control methods currently practiced around the State would continue. While existing methods can effectively control strawberry guava in limited areas, none are effective on the landscape level for slowing the spread of strawberry guava into native forest across large mauka areas. Generally speaking these methods are expensive and can result in significant environmental and cultural impacts as side-effects. The potential non-biological control methods usually include a combination of the use of herbicides, hand and mechanical cutting efforts, and mechanized grubbing. Herbicide and mechanical techniques are being applied in various areas of the Hawaiian Islands, particularly where complete eradication of strawberry guava in limited areas is desired.

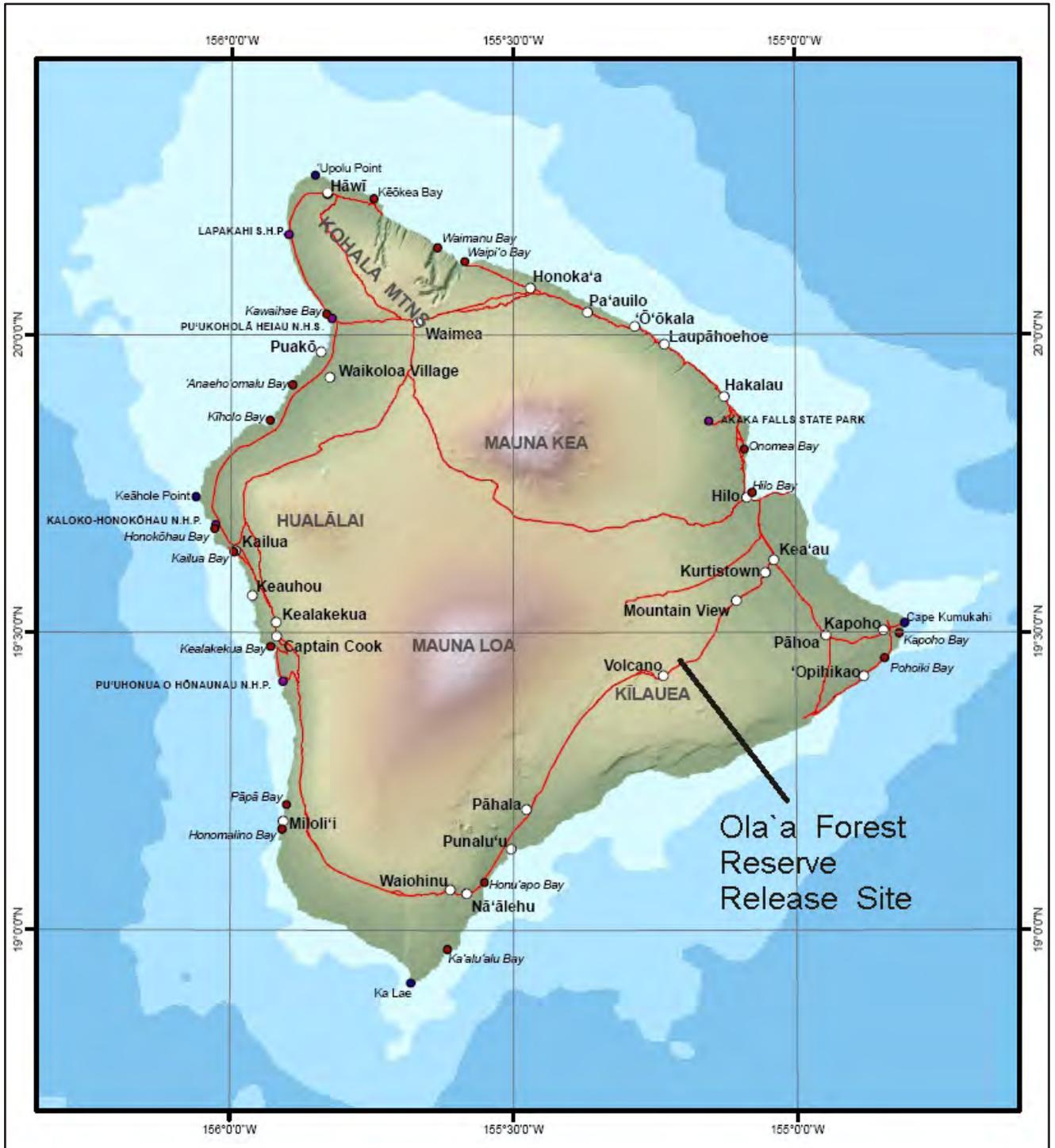


Figure 2. Location of proposed initial release site at Ola'a, Hawai'i Island.

Successful herbicide or mechanical treatment can be conducted in areas that are small, adjacent to existing roads, and not highly sensitive for reasons of erosion, water resources, or neighbors. However, these treatments are not effective over large tracts, within areas remote from roads, or in certain environmentally and culturally sensitive contexts.

STRAWBERRY GUAVA: NATURAL AND CULTURAL HISTORY

In its native Brazil, strawberry guava is a small tree, 3 to 16 feet tall, rarely growing to 40 feet. Trees growing within forests have slender, twisted stems and small crowns, whereas open-grown trees have dense, spreading crowns (Hodges 1988). Strawberry guava usually occurs as scattered individual trees and rarely in small clumps (Ibid). Flowering occurs mainly in November-December, and fruits mature during February-April (Reitz et al. 1983). Yellow and red-fruited varieties occur, but the former is much more common. The red-fruited variety may be distributed primarily above 2,300-2,700 feet in elevation (Hodges 1988; Vitorino et al. 2000). At upper elevations in its southern range in Brazil, strawberry guava persists in subtropical conditions, experiencing repeated winter frosts. Although not planted commercially on a significant scale, strawberry guava has been cultivated both for its fruit and ornamentally, and is distributed in Brazil beyond its natural range. It is also a popular fuel wood (Hodges 1988).

Strawberry guava is common on all the main Hawaiian Islands except Ni‘ihau and Kaho‘olawe. Although strawberry guava is seen wild in areas with annual rainfall as low as 40 inches and can tolerate the low temperatures found up to roughly 5,000 feet in elevation, it is generally concentrated between sea level and 4,000 feet on the windward sides of islands or at cooler and moister elevations in some leeward areas. Although it is found at sea level in coastal areas, it is not highly salt tolerant and is not part of the shoreline flora. It is found scattered in nearly pristine native forests, disturbed native forests, and non-native forests, and also spreads into pasture land and farms. Strawberry guava is not particular as to substrate and it is found in soils of all types, from deep ash to weathered lava to young lava flows. As a result, it is found in many hydrological contexts as well, from areas without streams to highly dissected landscapes, on all types of slopes. Although not classified as a wetland plant, it is reasonably tolerant of short periods of standing water as well. Many casual observers believe that strawberry guava is confined to hedgerows along roads and does not invade the native forest without some pre-existing human disturbance. However, the opposite is true, as it is a very effective invader and is found deep in remote areas. The amount of fruit produced by strawberry guava trees in Hawai‘i is difficult to estimate, but it is likely to be immense, based on the plant’s widespread distribution and the fruit masses it produces in the absence of predators. Humans account for very little of the consumption of the fruits produced. Pigs and rats consume some of this mass, but probably the majority remains on the ground and rots, serving as food for alien fruit flies, including the Oriental fruit fly and Mediterranean fruit fly, which cost taxpayers and farmers millions of dollars annually in quarantine and eradication efforts (Harris et al. 1993; Kaplan 2004; Vargas, Harris, Nishida 1983, Vargas, Nishida, Beardsley 1983; Vargas et al. 1990). Attempts at management of fruit fly pests in Hawai‘i are severely constrained by the abundance of fruiting strawberry guava (Vargas and Nishida 1989; Vargas et al. 1995). Although research is ongoing, ornithologists have observed various introduced birds such as Melodious Laughing Thrush (*Garrulax canorus*), Red-billed Leiothrix (*Leiothrix lutea*), Northern Cardinals (*Cardinalis cardinalis*), and Japanese White-eyes (*Zosterops japonicus*) utilizing the fruit; in general, native birds do not consume this fruit, and the prevalence of strawberry guava is one more factor that disadvantages native versus introduced birds in the lowland rainforest (Patrick Hart personal communication to Ron Terry, 2009).

Tectococcus ovatus is entirely specific to strawberry guava and one very closely related plant not found in Hawai‘i. It does not feed on or otherwise directly affect any animal species. The exclusive relationship between *Tectococcus ovatus* and strawberry guava, which is typical of other gall-forming insects, precludes the insect from shifting to feed on other plant species. Such a shift would require the species to evolve new traits. While the potential for this evolution does exist, given scientific knowledge about evolutionary processes and the life history of related and similar insects, the timeframe for

Tectococcus ovatus to evolve the ability to use a new host plant would be exceedingly long – many thousands if not millions of years. The likelihood of such evolution is of similar magnitude for hundreds of other insect species already present in Hawai‘i, which also have evolved close associations with their host organisms over long periods of time.

Strawberry guava was introduced to Hawai‘i in 1825 for use as an ornamental landscaping plant. As early as 1832, nurseries were selling strawberry guava seeds and trees in Hawai‘i for this purpose. There is no doubt that during the nineteenth century the fruit produced by these trees was consumed by humans and animals alike. In 1914, the Hawai‘i Agriculture Experimental Station explored the exportation of strawberry guava as a possible commercial venture, but they found the fruits to be unsatisfactory for storage and shipping. As with common guava (*Psidium guajava*), strawberry guava was eaten raw and used to produce jams and jellies. Anthropologists studying Hawaiian household customs in the early twentieth century include “guava” among examples of food found in a typical household (Green and Beckwith 1928; MacCaughy 1917). As the species was not specified this could have included both *Psidium guajava* and *Psidium cattleianum*. A book published by the University of Hawai‘i in 1936 encouraged people to use strawberry guava and other commonly available fruits to make up for inadequacies in diet (Miller et al. 1936). The use of strawberry guava as a food source in Hawai‘i has likely not changed much since the nineteenth and early twentieth centuries. Many residents and visitors to Hawai‘i can attest to picking and eating fresh strawberry guava fruits right from the tree, and jellies and jams are still produced at the household level. Strawberry guava is often cited as a favorite of children and is noted as a pleasant recollection of childhood for many Hawai‘i residents.

A mutually beneficial relationship between strawberry guava and feral pigs (*Sus scrofa*) has developed with significant consequences for the proliferation of the former and a potential concomitant increase in the range of the latter. The populations of feral pigs which now roam the forests of Hawai‘i are descendants of the introduced and more aggressive European boars, which interbred with and eventually displaced the smaller Polynesian pigs. Pigs have since developed mutual relationships with invasive species, whereby pigs forage on the invasive plants, and then carry the seeds to other areas of the forest. In 1976, scientific evaluation of the Kipahulu Valley on Maui (Diong 1982) found an “emergency situation” in which the synergistic movement of strawberry guava and pigs was documented. Pigs dropped seeds into previously uninfested areas, which produced more plants and fruits, in turn attracting more pigs. Although pigs are omnivorous, studies of feral pig diets in Hawai‘i have found that plant materials make up most of their diet, which is influenced by habitat. Consequently, a pig’s diet may be as little as 0%, or as much as 70%, sweet fruits such as papaya, passion fruit, and strawberry guava. The varied diet includes a significant consumption (over 50%) of ferns and grasses, as well as earthworms and carrion for protein (Nogueira et al. 2007).

While it is difficult to quantify the relationship between fruit production and pig populations, the opportunistic nature of the *Sus scrofa* diet would indicate that the most likely result of a reduction in strawberry guava fruits would be for pigs to consume other available foods, and it is unlikely that any significant impact on pig populations would be observed, although localized reductions in populations may occur in some areas. Without discounting the importance of pigs for subsistence in Hawai‘i, it is important to also consider the well-documented negative impact that pigs have on native species. Pigs are notably destructive to vegetation and the link between pigs and mosquito-borne illnesses that threaten native birds has long been established. From a conservation biology standpoint, the impacts of large feral pig populations on the native forests are considered to be detrimental to the ongoing maintenance of healthy forests, and over decades the land management organizations in Hawai‘i have spent hundreds of thousands of dollars on fencing and ungulate removal projects to protect native forest areas. A cultural impact assessment for the 1,264 acre Kapunakea Preserve on Maui concluded that, “Strawberry guava...is a weedy tree spreading rapidly in the West Maui Mountains, in part, because of the foraging of feral pigs” (Gon 2008:12).

The Kapunakea cultural study also concluded that, “Strawberry guava forms impenetrable thickets and develops strong root systems that can destroy the integrity of an archaeological site” (Gon 2008:12). Invasive vegetation control is always a concern when considering the long-term preservation of archaeological resources. On a roughly 350 acre section of land owned by Kamehameha Schools in the upland portions of Kahalu‘u Ahupua‘a in North Kona, strawberry guava was identified as one of the most significant threats to the numerous (roughly 3,500) archaeological features of the remnant agricultural fields documented on their property (Rechtman Consulting 2004). The only techniques currently available for control of invasive vegetation in and around archaeological sites are limited to the use of herbicides and hand-clearing. Mechanized clearing is out of the question as it also results in the destruction of the archaeological features.

It is well documented that the spread of strawberry guava into native forests is devastating to the indigenous flora, having been identified as a threat to the habitat of more than seventy-five federally listed threatened or endangered Hawaiian plant species. This threat also has significant cultural ramifications. The uses of native wet and mesic forest plants in traditional Hawaiian culture, and their appearances in Hawaiian mythology, are extensive (see Kraus 1993); and the trees, flowers, and woods within native forests continue to be extensively used in Hawaiian cultural practices. These native plants represent the physical forms, or *kinolau*, of the ancestral deities called *‘aumakua*. The upland forests, now some of the last refuges for native Hawaiian plants and animals, are considered *wao akua*, or the regions of the gods. These *wao akua* are sacred and, because of the spread of strawberry guava and other invasive species, are now under serious threat. The loss of these remaining wet forests would be an irrevocable loss to Hawaiian culture. The continuing invasion by strawberry guava will severely impact these traditional resources and associated practices, and eventually may eliminate many of the native plant species. The relationship, however, goes deeper than the use or exploitation of natural resources. Within a Hawaiian perspective, natural and cultural elements, and physical and spiritual realms, are not viewed as separate, but rather parts of an integrated whole. Taking care of the land also helps sustain the culture; and the integrity of the *ahupua‘a*, the forests and the watersheds from *mauka* to *makai*, is a critical part of this care. It is for this reason that nurturing outposts of at least limited biological integrity, such as the forest area on Hawai‘i Island referred to as *Wao Kele O Puna*, now in the care of the Office of Hawaiian Affairs, have been so important to Hawaiian cultural practitioners. If *Wao Kele O Puna* and other lowland rainforests of the Hawaiian Islands degrade into a virtual monoculture of strawberry guava, far more than biological diversity will be lost. Chants and *mele* that celebrate the sights, sounds and aromas of the forest will have meanings that can no longer be physically experienced. They will become mere historical accounts of times past, the antithesis of a thriving, living culture.

SUMMARY OF CONSULTATION

As part of the planning process for the potential release of *Tectococcus ovatus* five open-house, information-sharing meetings were held, one meeting each on O‘ahu, Maui, and Kaua‘i; and two meetings on Hawai‘i Island, one in Kona and one in Hilo. Relative to potential cultural issues, public comments fell into two general categories: support for the proposed project on the grounds that the native forests (as cultural resources) need to be restored; and opposition to the proposed project (primarily heard on Kaua‘i) based on the fear that the reduction in strawberry guava will lead to a reduction in feral pig populations and thus have an effect on subsistence activities, namely the hunting of feral pigs. While most Hawaiian cultural specialists would agree that pig hunting was not a traditional cultural practice (see discussion in Burrows et al. 2007), hunting pigs for sport and for subsistence has become a customary practice for many Hawai‘i residents, independent of ethnic background. As Maly and Maly (2004:74) point out based on an extensive review of more than 60,000 native Hawaiian land documents dating between 1846 to 1910, “nearly every reference was in the context of them [pigs] being near-home and as being cared for (raised), not hunted.” While not identified as a cultural practice for the purposes of this study, the potential secondary effects of the release of *Tectococcus ovatus* on pig hunting activities should nonetheless be a socioeconomic consideration within the overall EA.

As an introduced species, strawberry guava is having a devastating effect on native forests and the natural and cultural resources contained therein. Therefore, as part of the current assessment, in addition to the five open-house meetings, it was deemed appropriate to individually consult with native Hawaiian cultural practitioners with connections to Hawai‘i’s forest resources. Dawn Chang of Ku‘iwalu LLC conducted the consultations. While this consultation process was limited in scope and time, it was intended to engage those consulted in a more culturally sensitive small talk story approach. It has been our experience that people, in particular native Hawaiians, tend to be more candid and forthcoming in such a setting. The conversations took place within their community or their office at their convenience. At times there was the sharing of food as a gesture of appreciation. The consultations were conducted with consideration of the following principles: *mākia* or being purposeful, attentive, and respectful of their time; *ha‘aha‘a* or with humility and respectful recognition that individuals have different opinions based upon respective areas of expertise; *hilina‘i* or trust, generally based upon a pre-existing personal relationship or referral by someone they trust; and finally, *kuleana* or responsibility to one another and to our cultural and natural resources. Table 1 lists the individuals consulted.

Table 1 Cultural consultants.

<i>Name</i>	<i>Association</i>	<i>Affiliation</i>	<i>Date</i>
Samuel Gon, III	Cultural practitioner	Nature Conservancy	3/23/09
Lloyd Case	Cultural practitioner/ Subsistence hunter	Hawaii Wilderness Assoc.	4/2/09
Leimana DaMate	Cultural practitioner	‘Aha Ki‘ole Advisory Comm.	4/2/09
Jonathan Scheuer	Land manager	OHA	4/16/09
Chuck “Doc” Burrows	Cultural practitioner	‘Ahahui Mālama I Ka Lōkahi	4/16/09
Kale Gumapac	Cultural practitioner	Kanaka Council	3/3/09
Ben Tajon	Cultural practitioner	Kanaka Council	3/3/09
Huihui Kanaka‘ole	Cultural practitioner	Edith Kanaka‘ole Foundation	5/5/09

Since its introduction to Hawai‘i roughly 180 years ago, strawberry guava has become known in Hawaiian as *waiawī* (the yellow variety) and *waiawī ula‘ula* (the red variety). None of the consultants identified any traditional cultural practices or belief associated with strawberry guava. While there was some discussion about the use of guava leaves for medicinal purposes it was clearly the *kuawa* (*Psidium guajava*) that was being referred to and not the strawberry guava (*Psidium cattleianum*).

There were some who indicated that cultural practitioners, including *hula* and *lua halau* and woodcrafters, use the strawberry guava wood in the place of harder to acquire native species for the manufacture of certain implements. However, both Sam Gon and Doc Burrows commented that practitioners should be using the native woods rather than introduced woods, and that if strawberry guava is not controlled there will be far fewer native woods available for cultural use.

Lloyd Case and Leimana DaMate also stated that many people on the Big Island burn strawberry guava woods when making smoke meat. Lloyd also expressed concerns as a subsistence pig hunter about the potential adverse impacts to the pig populations that may rely on strawberry guava as a food source.

All of the consultants expressed concerns regarding adverse impacts to native forest resources that will continue to occur as the result of the uncontrolled spread of strawberry guava. Jonathan Scheuer, speaking on behalf of OHA, felt very strongly that if nothing is done now, the native forests in *Wao Kele O Puna* on the Big Island will be destroyed. OHA recently acquired *Wao Kele O Puna* and as cultural steward of the land, has a *kuleana* or responsibility to ensure that the native forests are sustained and available for future generations. The cultural landscape of this and other native forests is a very significant resource which must be protected. While Huihui Kanaka‘ole recognized the importance of

protecting the native forests from invasive species, she stated that the Edith Kanakaole Foundation opposes the use of biocontrol measures because they find no cultural basis in Hawaiian chants to support such a practice. Sam Gon and Doc Burrows spoke passionately about protecting our native forests from invasive species so that cultural practitioners have resources to gather. Sam spoke about the *ahupua'a* land management concept and how everything is interconnected and interrelated from a Hawaiian cultural perspective. He shared that from his experience there is a visible difference in the water quality of streams in the vicinity of native forests as compared to forests comprised of non-native species. In the former instance the water is clean and clear and in the latter, the water appears dirty and murky.

As for the cultural appropriateness of the use of a biocontrol agent to manage strawberry guava, while all the cultural consultants agree that something needs to be done to protect the native forests to ensure that Hawaiians and others have access to exercise their traditional customary practices, and that the strawberry guava threatens the health of our native forests, there is some debate as to whether biocontrol is the culturally appropriate option. Kale Gumapac and Ben Tajon of *Kanaka* Council expressed concerns that all available options should be exhausted before the use of biocontrol to manage the growth of strawberry guava. Huihui Kanaka'ole of the Edith Kanaka'ole Foundation would prefer that the approach focus on getting families to reconnect with the native forests so that they would exercise their *kuleana* to care for the resources. Sam Gon of the Nature Conservancy, Doc Burrow of *'Ahaui Mālama I Ka Lōkahi*, and Jonathan Scheuer of the Office of Hawaiian Affairs see the problem as very urgent, and they are convinced and feel quite comfortable that biocontrol is an appropriate, measured response and the only effective means of controlling the growth of strawberry guava, which will afford the native forests a chance to recover. Sam Gon noted that while ancient Hawaiians didn't use biocontrol as we know it today, they certainly did use some plants and animals to control others, practicing a concept similar to modern biocontrol. None of the cultural consultants suggested that strawberry guava thickets are a resource that should be saved; rather they expressed their differences on the approach for controlling its spread.

IDENTIFICATION OF CULTURAL RESOURCES, PRACTICES, AND BELIEFS; AND THE IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

The OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are natural features of the landscape and historic sites, including traditional cultural properties. A working definition of traditional cultural property is:

“Traditional cultural property” means any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in an ethnic community's history and contribute to maintaining the ethnic community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both.

The origin of the concept of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service. “Traditional” as it is used, implies a time depth of at least 50 years, and a generalized mode of transmission of information from one generation to the next, either orally or by act. “Cultural” refers to the beliefs, practices, lifeways, and social institutions of a given community. The use of the term “Property” defines this category of resource as an identifiable place. Traditional cultural properties are not intangible, they must have some kind of boundary; and are subject to the same kind of evaluation as any other historic resource, with one very

important exception. By definition, the significance of traditional cultural properties should be determined by the communities that value them.

It is however with the definition of “Property” wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation of potential Hawaiian traditional cultural properties, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often times cosmologically tied to the rest of the landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. A further analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities resulted from the *Ka Pa‘akai O Ka‘āina* v Land Use Commission court case. The court decision established a three-part process relative to evaluating such potential impacts: first, to identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised; second, to identify the extent to which those resources and rights will be affected or impaired; and third, specify any mitigation actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

During the course of this study there were no cultural resources, practices or beliefs identified to be directly associated with strawberry guava. There were no stands of strawberry guava identified as traditional cultural places, and a review of the ethnobotanical literature (i.e., Gutmanis 1976; Handy et al. 1991; Krauss 1993; Neal 1965; Palmer 2003) failed to identify any cultural uses of strawberry guava. There is however a single strawberry guava tree located on the historic Walker Estate that has been placed on Oahu’s Exceptional Tree List. Trees are generally added to this list based on significant age and/or size, and owners receive a tax credit for the care of those trees. If this specific tree were to become infected with *Tectococcus ovatus*, it would not lead to mortality, rather it might form leaf galls and inhibit fruiting. If that is considered to be an undesirable result, the effects on *Tectococcus ovatus* on a single tree can be mitigated through the application of any number of widely available horticultural oils.

Conversely, when considering the areas that strawberry guava invades, many would agree that the native forests of all of Hawai‘i’s islands are part of a general cultural landscape; and thus, from an indigenous perspective and with respect to this study, should be considered a cultural property. The uncontrolled spread of strawberry guava throughout these areas can be seen as a significant cultural impact. Furthermore, strawberry guava has also invaded formerly forested areas that ancient Hawaiians cleared and used for agricultural practices, most significantly on Maui and Hawai‘i islands. The threat to the archaeological resources of these areas from the spread of strawberry guava is enormous, both as a result of natural processes and during attempted mechanical control. The no action alternative will lead to continued cultural impacts and provides no mitigative relief for such impacts.

CONCLUSION

It is the conclusion of the current study that the proposed action will have a positive impact and that no action will have a negative impact. The proposed action alternative will serve to enhance valued natural and cultural resources within Hawai‘i’s forested areas and beyond, and will have no significant adverse impact on any cultural resources, practices or beliefs. The no action alternative has an unmitigated significant negative impact. No action will lead to continued degradation of Hawai‘i’s valued natural and cultural resources as strawberry guava continues to spread rapidly and overwhelm native forests.

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ENVIRONMENTAL ASSESSMENT

Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

APPENDIX 4 Comments to Draft EA and Responses

Appendix 4 contains a copy of all the comments on the Draft EA, divided into agency comments and individual comments (including individuals who signed on behalf of organizations, which are listed after the individual's name). It should be noted that one commenter provided copies of two petitions, one version of which referenced the EA, with undated signatures. The petitions total 382 pages and are not included in printed versions of the EA for purposes of space. A CD-ROM with a pdf scan of the petitions accompanies printed versions of the EA and is also available in the EA/EIS archives of the website of the Hawai'i State Office of Environmental Quality Control.

An index to the commenters is provided on the next page.

Following the index is a list of frequently asked questions or FAQs, which is referenced in the replies to most commenters and which accompanied each letter response to the commenter.

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Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Frequently Asked Questions (FAQs)

Note: Page numbers refer readers to detailed discussions and citations in the Final EA, available at <http://hawaii.gov/health/environmental/oeqc/index.html/>

1. Does strawberry guava really have adverse effects on native species and ecosystems?

Invasion by strawberry guava affects hundreds of thousands of acres of native forest across the state of Hawai'i. In much of this area its full impact has yet to occur, but tens of thousands of acres of low to mid-elevation rainforests have been overrun by dense thickets up to 30 feet high that suppress native species. Strawberry guava may be the perfect invasive plant. It grows quickly (p. 14); it tends to form dense thickets, crowding out native plant species that are unable to compete for the space (p. 10-12); it can grow in the shade (p. 30); it produces large amounts of fruit with many seeds spread by pigs and birds to create future generations (p. 9, 58); it is difficult to kill, as it sprouts prolifically from stumps and even cut branches, requiring multiple herbicide applications (p. 30); and it has no known enemies in Hawai'i (p. 2).

Because of these characteristics, strawberry guava has been recognized as one of the state's most disruptive alien weeds since at least the 1950s (p. 11). Land managers and other observers across Hawai'i have witnessed widespread transformation of native forests as strawberry guava has moved in and excluded native species. Attempts to prevent the devastating effects of this invasion using existing mechanical and herbicidal methods have been pursued for decades and continue today, but are widely recognized as inadequate given the scale of the invasion. Strawberry guava is specifically mentioned as a threat to at least 77 species of threatened and endangered plants in Hawai'i (p.43-44), and habitat destruction by this invader threatens native animals as well (p.45-46). Along with devastating effects on biodiversity, invasion by strawberry guava adversely impacts cultural resources, scenic beauty, and watershed values in Hawai'i. It also is recognized as a major threat in Mauritius, Reunion, the Seychelles, Society Islands, Fiji, Norfolk and elsewhere (p. 9).

2. Aren't there more appropriate species for biocontrol attention?

Conservation professionals in Hawai'i agree that strawberry guava is among the worst invasive plants threatening Hawaiian forests (p. 14-17). It has been consistently recognized as a high priority for biological control, along with species such as miconia and kahili ginger, which also are targets of ongoing biocontrol research. Unfortunately, Hawai'i has dozens of serious invasive plants which will require investments in careful management, including development of new biocontrol agents, over the coming decades. Prioritizing among these weed targets is indeed an important challenge.

3. Doesn't biocontrol often have severe unintended consequences, as with introduction of cane toad and mongoose?

Many people have the mistaken impression that a sugar plantation owner's ill-fated 1883 import of mongooses to control rat populations is a typical example of biocontrol. Actually, biocontrol is the careful and scientific introduction of a highly specialized organism to control the growth or spread of its invasive host organism. Unlike chemical and mechanical approaches, which are expensive and short-lived, biocontrol is cost-effective and long-lasting. By virtue of its specificity, biocontrol also avoids the damaging environmental effects of pesticides that sometimes can occur when they are used on a landscape scale or by inexperienced people (p. 17-18). Since 1975, when tighter review of biocontrol measures was enacted, more than 50 biocontrol species have been introduced to Hawai'i without any adverse effects (p. 36). Some of the invasive species in Hawai'i that biocontrol has helped suppress are Koster's curse (also known as *Clidemia*), ivy gourd, prickly pear cactus, and banana poka (p. 19).

4. Wouldn't it be more effective and efficient to remove strawberry guava thickets by clearing?

Negative effects such as erosion would be caused by large-scale land clearing, unlike biological control which has a gradual impact. Herbicides can be effective for control in limited areas with low density infestations, but if used on a large scale and by many landowners, the risk of misapplication and environmental harm increases. At the highest strawberry guava densities, herbicide application to all stems on a given acre can exceed label dosage. Removing strawberry guava manually is extremely labor-intensive. Manual control without the use of herbicide is generally ineffective because of strawberry guava's propensity to resprout from cut stumps and discarded stems (29-30). Control using existing methods is generally practical only where the plants are readily accessible by roads, a small fraction of the invaded landscape (p. 30-33). Estimates of the cost of manual removal demonstrate that it is prohibitively expensive across large areas, ranging to over a third of a billion dollars in East Hawai'i Island conservation areas alone (Appendix 2).

5. Won't the scale insect evolve to eat something else or otherwise harm other plants and animals?

The evidence from the native range of *Tectococcus ovatus* indicates an extremely specialized host relationship, since this insect is found only on *Psidium cattleianum* (strawberry guava) and its very close relative *Psidium spathulatum* (a plant

found only in Brazil). The host range of this insect in Brazil remains extremely narrow in spite of the great diversity of plant species there, including hundreds of species in the same family as strawberry guava. Close host relationships are quite common between insects and plants, especially gall-forming insects, which are typically very highly specialized to feed on a single host plant or very narrow range of closely related plant species. This is because producing galls requires controlling the growth of plants in precise ways at the cellular level. These insects and their host plants represent stable, ecologically and physiologically intimate relationships that have evolved over many thousands to millions of years (p. 1). Experience with agents for biocontrol of weeds over the last 100 years indicates that host specificity of agents can be evaluated accurately in advance and that use of nontarget species has been almost entirely predictable. Evolution of ability to use host plants in new, unpredictable ways has never been documented in over 1,100 cases of weed biocontrol worldwide (p. 38-39).

6. Was testing of the scale insect adequate?

Scientifically rigorous studies to safeguard Hawai'i have been conducted and approved. The scale insect was the subject of extensive testing to see whether other plants in Hawai'i could serve as hosts. Tests on over 100 plants, including close relatives of strawberry guava, have demonstrated that the insect is highly specific (Appendix 1). Only at the end of this process do state and federal agencies carefully consider a proposed release and approve permits (p. 18). All laboratory tests and field studies, which include more than 15 years of observation in Brazil where the scale insect originates, indicate that it is highly specialized to feed on only strawberry guava in Hawai'i (p. 36-38). In its native range the scale insect has never attacked agricultural crops or been otherwise noted as a pest.

7. Isn't strawberry guava fruit essential to feral pigs, and with less fruit, won't pig numbers decline and hunting suffer?

The most likely result of a reduction in strawberry guava fruits would be for pigs to consume other available foods. It is unlikely that any significant impact on pig populations would be observed, although gradual changes in localized foraging patterns may occur since pigs are attracted to areas where fruit are abundant. Wild pigs do make use of strawberry guava seasonally, but it is unlikely that the fruits are an essential part of their diet. Although pigs are omnivorous, studies of feral pig diets in Hawai'i have found that plant materials such as ferns and grasses make up most of their diet, which also includes earthworms and carrion for protein. Many high-elevation areas with little strawberry guava on Maui and the Big Island are nevertheless heavily infested with pigs, so substantial populations are likely to persist even if strawberry guava fruit become less abundant. Because dense stands of strawberry guava inhibit human access to forests, it is likely that hunting over the long term would benefit from the biocontrol action (p. 64-65).

8. Won't reducing strawberry guava fruiting and wood growth have adverse effects on households and businesses that depend on harvesting the fruit or wood for home consumption or selling jelly or other products?

The insect's natural presence on strawberry guava in Brazil does not reduce the plant's usefulness for either fruit or wood (p. 7). As the scale insect will not kill strawberry guava plants or taint their fruit, but only reduce fruit production and tree growth, people will still be able to pick fruit and gather the wood, as Brazilians do in their forests where the trees are preyed upon by a far greater multitude of insects. The scale insect may not reach backyard trees isolated from forests because of its limited dispersal ability (p. 1).

9. What will be the effect to the scenic value of the landscape?

The leaf galls produced by the scale insect in Brazil do not lead to severe defoliation or deformities in the tree. Severe defoliation would result mainly from an unusual combination of stresses such as prolonged drought, which would also affect most other plants (p. 35, 54). It is worthwhile to note that 'ōhi'a, celebrated for its grace and beauty in Hawaiian songs and chants, exhibits leaf galls produced by a native co-evolved insect, without any loss of its general attractiveness or that of its surrounding landscape. The majority of residents will be unaware that the scale insect is feeding on individual strawberry guava trees. It should also be noted that many observers who are appreciative of native species and concerned about the effects of strawberry guava find the monotypic thickets an unattractive reminder of devastation of the native forest, and in fact would rather see native species such as 'ōhi'a on roadsides (p. 66-67).

10. Doesn't strawberry guava provide essential food for birds and mammals?

Ornithologists have observed various non-native birds utilizing strawberry guava fruit, but native birds in general do not consume it. Native birds depend for food on the Hawaiian plants and insects that healthy native forests contain. Rats, mice, and non-native birds all probably benefit somewhat from consumption of strawberry guava fruit, although their use of this food source is not well quantified (p. 39). Any negative impacts on these species generally would be expected to benefit native ecosystems, which suffer a variety of negative impacts from these non-native animals (for example, disruption of native plant and animal life cycles, and spread of invasive alien plants).

William P. Kenoi
Mayor



Darryl J. Oliveira
Fire Chief

Glen P. I. Honda
Deputy Fire Chief

County of Hawai'i

HAWAII FIRE DEPARTMENT

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June 29, 2010

Dr. Neil Reimer
State of Hawai'i
Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawai'i 96814

SUBJECT: Draft Environmental Assessment
Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of
Native Forests in the Hawaiian Islands

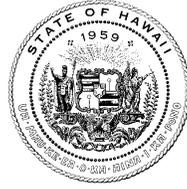
We have no comments to offer at this time in reference to the above-mentioned draft
Environmental Assessment.


DARRYL OLIVEIRA
Fire Chief

GA:lpc



NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Darryl Oliveira, Fire Chief
Hawai'i Fire Department
County of Hawai'i
25 Aupuni St., Suite 2501
Hilo, HI 96720

Dear Chief Oliveira:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your letter regarding the Draft EA dated June 29, 2010, in which you stated that your agency had no comments at this time.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU

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MUFI HANNEMANN
MAYOR

CRAIG I. NISHIMURA, P.E.
DIRECTOR

COLLINS D. LAM, P.E.
DEPUTY DIRECTOR

July 12, 2010

Dr. Neil Reimer
Hawaii State Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

Subject: Biocontrol of Strawberry Guava by its Natural Control Agent for
Preservation of Native Forest in the Hawaiian Islands

Thank you for inviting us to review the Draft Environmental Assessment (DEA). The Department of Design and Construction does not have any comments to offer at this time.

Should you have any questions, please contact Craig Nishimura, Director at 768-8480.

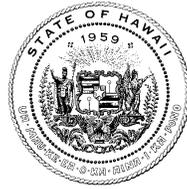
Very truly yours,

A handwritten signature in black ink, appearing to read "Craig I. Nishimura", is written over a horizontal line.

Craig I. Nishimura, P.E.
Director

CN:pg(372341)

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
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State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Collins Lam, Director
Dept. of Design and Construction
City and County of Honolulu
650 S. King St., 11th Floor
Honolulu, HI 96813

Dear Mr. Lam:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your office's letter regarding the Draft EA dated July 12, 2010, which stated that your agency had no comments at this time.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
TELEPHONE: (808) 768-8000 • FAX: (808) 768-6041
DEPT. WEB SITE: www.honolulu.gov • CITY WEB SITE: www.honolulu.gov

MUFI HANNEMANN
MAYOR



DAVID K. TANOUE
DIRECTOR
ROBERT M. SUMITOMO
DEPUTY DIRECTOR

2010/ELOG-1288(MH)

July 16, 2010

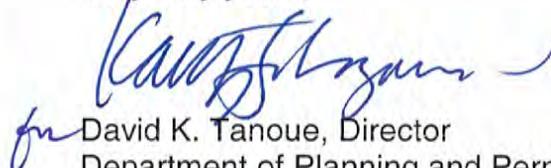
Neil Reimer, Ph.D.
Hawaii State Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

Subject: Draft Environmental Assessment for the
Biocontrol of Strawberry Guava

In response to your request for comments, which we received on June 22, 2010, we have no comments to offer. Should you have any questions, please contact Matt Higashida of our staff at 768-8045.

Very truly yours,

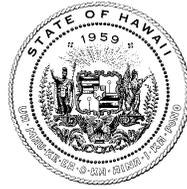

for David K. Tanoue, Director
Department of Planning and Permitting

DKT:js

cc: Paul Conry, Division of Forestry and Wildlife,
Department of Land and Natural Resources

StrawberryGuava

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David Tanoue, Director
Department of Planning and Permitting
City and County of Honolulu
650 S. King St.
Honolulu, HI 96813

Dear Mr. Tanoue:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your letter regarding the Draft EA dated July 16, 2010, in which you stated that your agency had no comments to offer.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



DEPARTMENT OF WATER SUPPLY

COUNTY OF MAUI

200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

July 21, 2010

Neil Reimer, Ph.D., Manager
Plant Pest Control
Hawaii Department of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

RE: Testimony in support of the proposed release of *Tectococcus ovatus* for the biological control of *Psidium cattleianum* (strawberry guava)

One of the Department of Water Supply's goals is to protect the integrity of surface and ground water resources. Watersheds collect, filter and store these water resources. This is accomplished through the balance and biodiversity of their native forests. Since its introduction to Hawaii in 1825, *Psidium cattleianum* has adapted and thrived in the native forests. It has significantly impacted the balance and biodiversity of the native forests by displacing other native plants and fauna, and affecting the collection, filtration and storage of water resources.

The use of manual controls on *Psidium cattleianum* are only successful in small, confined areas. The use of herbicides on this invasive species are harmful to the native forests, and therefore, to the surface and ground water resources that we are striving to protect. Both methods of control are also time-consuming and are not cost-effective.

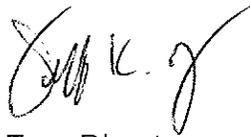
With strict controls, biocontrol has proven to be a safe method to target a specific invasive host. *Tectococcus ovatus* will control the host-specific *Psidium cattleianum*. It will control, but not eliminate it. This will significantly impact the native forests by allowing them to, once again, become balanced and biodiversed and allowing them to continue their function to collect, filter and store water resources.

"By Water All Things Find Life"

Neil Reimer, Ph.D.
Page 2
July 21, 2010

The Department of Water Supply supports the proposed release of *Tectococcus ovatus* for the biological control of *Psidium cattleianum*.

Sincerely,

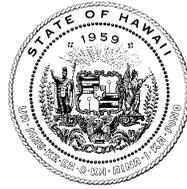
A handwritten signature in black ink, appearing to read "J.K. Eng". The signature is fluid and cursive, with the first name "Jeffrey" and last name "Eng" clearly legible.

Jeffrey K. Eng, Director

ayi

c: Department of Land and Natural Resources, Division of Forestry and Wildlife
West Maui Mountains Watershed Partnership

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Dave Taylor, Director
Maui Department of Water Supply
200 S. High St.
Wailuku, HI 96793

Dear Mr. Taylor:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your office's comment letter dated July 21, 2010, on the Draft EA, indicating support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

CHARMAINE TAVARES
Mayor
KATHLEEN ROSS AOKI
Director
ANN T. CUA
Deputy Director



COUNTY OF MAUI
DEPARTMENT OF PLANNING

July 20, 2010

Hawai'i State Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, Hawaii 96814

Attention: Dr. Neil Reimer

Dear Dr. Reimer:

SUBJECT: COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT (DEA) FOR THE PROPOSED BIOCONTROL OF STRAWBERRY GUAVA BY ITS NATURAL CONTROL AGENT FOR PRESERVATION OF NATIVE FORESTS IN THE HAWAIIAN ISLANDS. (EAC 2010/0012)

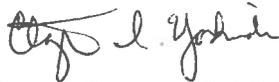
The Department of Planning (Department) is in receipt of the above-referenced request for Draft EA comments for the proposed Biocontrol of Strawberry Guava by its natural Control Agent for Preservation of Native Forests in the Hawaiian Islands. Our Department has reviewed the proposed project and has the following comments:

1. The Department agrees the Hawai'i State DLNR, Division of Forestry and Wildlife is the approving agency;
2. The project is subject to the Coastal Zone Management (CZM) Act HRS 205A. Please ensure that the proposed actions are consistent with the objectives and policies of the CZM Act, section 205A-2;
3. If any portion of the project is to be carried out within the Special Management Area (SMA) and within the County jurisdiction, then a Special Management Area (SMA) Use Permit Application will be required. The Department can provide SMA area maps for your use;
4. The Department requests that the Hawaii State Department of Agriculture address any potential inconsistencies with the newly adopted County of Maui 2030 General Plan Countywide Policy Plan; and
5. The Department would like the opportunity to comment on the Final Environmental Assessment when available.

Dr. Neil Reimer,
July 20, 2010
Page 2

Thank you for the opportunity to comment. Should you require further clarification, please contact Staff Planner Anna Benesovska by email at [anna.benesovska @mauicounty.gov](mailto:anna.benesovska@mauicounty.gov) or by phone at (808) 463-3867.

Sincerely,

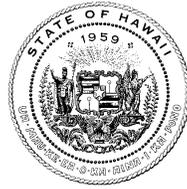


CLAYTON I. YOSHIDA, AICP
Planning Program Administrator

for KATHLEEN ROSS AOKI
Planning Director

xc: Paul Conry, Hawai'i State DLNR, Division of Forestry and Wildlife, 1151 Punchbowl Street, Room 325, Honolulu, Hawaii 96813
Anna Benesovska, Planner
Project File
General File
KRA:CIY:ANB:xx
K:\WP_DOCS\PLANNING\EAC\2010\0012_BiocontrolofGuava\CommentLtr.doc

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

William Spence
Director, Dept of Planning
County of Maui
250 S. High St.
Wailuku, HI 96793

Dear Mr. Spence:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your office's comment letter dated July 20, 2010, on the Draft EA.

Since publication of the Draft EA, DLNR and HDOA have determined that HDOA should act as both proposing and approving agency. DLNR has continued to assist in the review of the Draft and Final EAs. We do not see any legal connection between the project and Chapter 205A, although the project would appear to be consistent with the objectives and policies of Chapter 205A. Similarly, we do not see any legal requirement for an SMA permit. The consistency of the project with the Maui County General Plan is discussed in the Draft EA. You will be provided a copy of the Final EA.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

LINDA LINGLE
GOVERNOR OF HAWAII



CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EPO-I-3234

June 24, 2010

Dr. Neil Reimer
Hawaii State Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

SUBJECT: Draft EA for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have no comments at this time. We strongly recommend that you review all of the Standard Comments on our website: www.hawaii.gov/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this application should be adhered to.

The same website also features a Healthy Community Design Smart Growth Checklist (Checklist). The Hawaii State Department of Health, Built Environment Working Group, recommends that State and county planning departments, developers, planners, engineers and other interested parties apply the healthy built environment principles in the Checklist whenever they plan or review new developments or redevelopments projects. We also ask you to share this list with others to increase community awareness on healthy community design.

If there are any questions about these comments please contact the Environmental Planning Office at 586-4337.

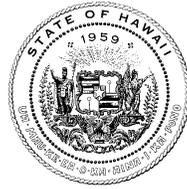
Sincerely,

A handwritten signature in cursive script that reads "Genevieve Salmonson".

GENEVIEVE SALMONSON
Compliance Environmental Ombudsman
for Environmental Planning Office

c: Hawaii State DLNR
Division of Forestry & Wildlife

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Genevieve Salmonson
Environmental Planning Office
Hawai'i Department of Health
P.O. Box 3378
Honolulu, HI 96801

Dear Ms. Salmonson:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your letter regarding the Draft EA dated June 24, 2010, in which you recommended that we review DOH standard comments (which was done) and consult a smart growth design checklist, which we do not believe is applicable because no building or development is proposed. We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
2010-TA-0358

JUL 22 2010

Dr. Neil J. Reimer
Hawaii Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawaii 96814-2512

Subject: Draft Environmental Assessment for Biocontrol of Strawberry Guava for the Preservation of Native Forests in the Hawaiian Islands

Dear Dr. Reimer:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) June 22, 2010, receipt of your Draft Environmental Assessment (DEA), entitled "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands."

Strawberry guava, an introduced tree, is one of the primary plant pests of Hawaii's native forests. It forms dense monotypic stands, preventing the recruitment of native understory vegetation. The fruit is consumed by non-native birds and feral pigs, facilitating rapid and far-ranging spread of this species into native forest habitats. Efforts to control strawberry guava and restore native ecosystems are hampered by its prolific re-sprouting and fruiting and as a result, current efforts have not resulted in widespread control of strawberry guava in Hawaii. The proposed biocontrol agent *Tectococcus ovatus* is expected to reduce the vigor of infected plants and greatly reduce fruiting.

Since rapid mortality of strawberry guava is not expected, its gradual decline should not result in rapid proliferation of other photophilic invasive plants such as grasses, nor result in significant increases in fire fuel loads. As you described, this process of decline may allow native plants to compete, and will supplement current mechanical and chemical control efforts to remove strawberry guava stands and minimize its spread. An increase in diverse stands of native trees and understory plants would provide superior habitat and foraging for native birds and invertebrates as opposed to monotypic stands of strawberry guava with little or no understory.

We commend the Hawaii Department of Agriculture for developing this DEA and addressing the public concerns related to this proposed biological control agent. We fully support the Hawaii Department of Land and Natural Resources' issuance of a permit for the release and monitoring of the scale insect, *Tectococcus ovatus*, on State forest land for the control of the invasive

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IN AMERICA** 

strawberry guava (*Psidium cattleianum*) in Hawaii. As stated in the DEA, we understand field release permits from the Hawaii Department of Agriculture and the U.S. Department of Agriculture – Animal and Plant Health Inspection Service have been secured for this action. Few if any adverse impacts are foreseen as demonstrated by extensive host specificity testing involving about 100 related native, commercial, and ornamental species as well as observations of the host range of *Tectococcus ovatus* indicating that it will only attack strawberry guava in Hawaii.

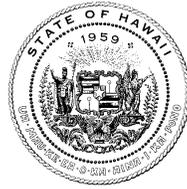
We appreciate your efforts to aid in the reduction of the threats posed by invasive species in the State of Hawaii. If you have questions, regarding this letter, please contact Daniel Clark, Supervisory Fish and Wildlife Biologist, Invasive Species Program (phone: 808-792-9426; fax: 808-792-9581).

Sincerely,

A handwritten signature in blue ink, appearing to read "Daniel A. Clark", with a long horizontal flourish extending to the right.

for Loyal Mehrhoff
Field Supervisor

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Loyal Mehrhoff
Field Supervisor
U.S. Fish and Wildlife Service
300 Ala Moana Blvd., Rm 3-122
Honolulu, HI 96850

Dear Dr. Mehrhoff:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

7/17/10

I am writing to voice my strong support for the release of the guava scale insect for the control of strawberry guava.

I have worked as a field technician for the top four conservation organizations on the island of Oahu. Although I am not writing to represent any organization now, I do hope that my personal experiences will be of some value to you.

Most of my work lately has been managing forests in the northern Wai'anae mountains of Oahu for the protection of endangered and rare plants, insects, snails and birds. Each day I spend in the field is a day in or near a forest choking with dense guava thickets.

Several weeks ago I led a group of people into the bog at the top of Oahu, on Mt Ka'ala. We were hunting for weeds and rare plants in what should be the most pristine place on my home island. To get there and back required 6 paid staff a full day of gear preparation, travel up the steep mountain road, and difficult hiking. The most valuable thing we did that day was to kill a single strawberry guava that was rapidly overshadowing a very rare shrub, *Schidea triverva*. Without our expensive human intervention that plant would be dead in a decade. It would have become another victim of native forest loss.

This single strawberry guava had grown to be the tallest tree in the forest and had spread horizontally to completely shadow all the natives in a six meter circle. It did this in about 7 years. The seed that started it was probably flown up the mountain by a non-native bird, feasting in the dense guava forest down the slope.

How does guava grow so rapidly to become a forest-busting monster? It has no insects to limit its growth. How does it produce so many seed-stuffed fruits to feed so many invasive birds? It has no insects to control its growth. What must responsible stewards of native forests do to help now? Introduce an insect predator to limit the growth and reproduction of guava. It is clear, to do nothing now would be a death sentence for many of our native plants and animals.

I wish my example of protecting that beautiful rare shrub was unusual but it is not. We go out to the forest and see examples of guava smothering natives everywhere.

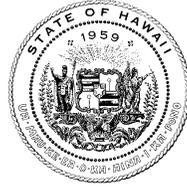
When my daughter hikes in these mountains years from now I hope she will see native forests and not a dense foreign thicket. I hope she thanks you then for the part you will play in the stewardship of her natural inheritance.

Respectfully,

Larry Abbott
665 Iliaina Street
Kailua, HI 96734

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Larry Abbott
665 Iliaina Street
Kailua, HI 96734

Dear Mr. Abbott:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 17, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native species in Hawai'i, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

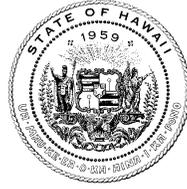
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Please don't release the Tectococcus ovatus, a Brazilian scale insect to control the strawberry guava here in Hawaii. I was born and raised here on Kauai and both me and my kids grew up eating the strawberry guava whenever we're in the mountains. I've seen the strawberry guava flourish thru the years and i don't see any bad effects in the land and environment. Why don't you guys please concentrate and turn your efforts to controlling or even eliminating the **Clidemia hirta** and the **Guinea grass panicum maximum**. These two really awful plants don't have any fruits that we can eat and enjoy. Thru the years i have seen these plants damage the whole island and state from mountains to valleys to backyards in neighborhoods. **Please reconsider and please turn you efforts to controlling and eliminating the Clidemia hirta and Guinea grass panicum maximum.**

Tim Agustin
Lihue, Kauai

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Tim Agustin

Dear Mr. Agustin:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 23, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the effects of strawberry guava and control of other invasive species, please see FAQ Nos. 1 and 2, respectively. In regard to your comment about growing up eating strawberry guava in Kaua'i, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so.

We understand your concern over other environmental weeds on Kauai. *Clidemia hirta* remains a high priority target for biocontrol research in Hawai'i. HDOA is currently evaluating a new agent which may prove valuable in managing this weed in wet forest environments.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Joseph Ah Choy
P.O. Box 142
Papa'oa, ~~Honolulu~~, Hawaii ~~96727~~ 96780
(808) 962-6576

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A thorough environmental impact statement must be done.

Sincerely yours.

Joseph Ah Choy

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Joseph Ah Choy
P.O. Box 142
Papaaloa, HI 96780

Dear Mr. Ah Choy:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I'm writing to encourage you to use biocontrol to slow down the growth rate and spread of the very invasive strawberry guava, which was imported from Brazil. The Brazilian scale insect, which is the native control insect for strawberry guava has been researched and tested for 15 years and tests show that the bug will only survive on strawberry guava and not even on other species of guava. Current control options (chemical and mechanical control) are limited and unable to address the magnitude of the problem and rate of spread.

Unfortunately, there's been an abundance of misinformation and almost hysteria by many people who don't understand the seriousness and magnitude of this threat. They seem to think that we are talking about (an impossible) total eradication of strawberry guava, however if the scale insect is released, there will still be strawberry guava fruit and wood in the forests, though the reproduction and spread would be slowed down. I grew up enjoying the fruit also, but never dreamed it would become so hard to control and cause so many problems to our native forests.

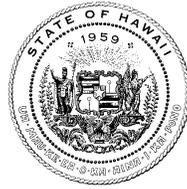
I live on Hawai'i Island and constantly witness just how prevalent strawberry guava is in our forests and along highways. And, when a thicket of strawberry guava is encountered while hiking, the trail is often completely impassable due to the dense growth. In addition, I see the crowding out of native plants and trees in the forest which can't compete with the rapid reproduction and spread of this invasive plant. The strawberry guava invasion has also affected our native forests and watersheds by reducing water by 27-50% from our streams, soils, and groundwater systems.

We need to take action to save our native forests, animals, Hawaiian archaeological sites, and culturally significant plants. If no action is taken, strawberry guava will continue to spread at an alarming rate and severely damage our natural and cultural resources. Our unique native species are at risk and need our protection. We cannot let public hysteria and ignorance of the bigger picture curtail strong scientific studies and evidence that sustainable, long-term management can be done safely by releasing the Brazilian scale insect. We must do what is best for our native plants and animals and protect our natural and cultural resources that make Hawai'i the unique place that it is.

Mahalo for your consideration.

Christine Ahia.....

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Christine Ahia

Dear Ms. Ahia:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

JULY 21, 2012

TO WHO EVER IT MAY CONCERN:

I REALLY DO NOT LIKE THE IDEA IN RELEASING THE BRAZILLIAN SCALE INSECT AS A BIOCONTROL PLAN THERE SURELY MUST BE OTHER WAYS IN DEALING WITH THE PLANT, TO ME THE PLANT HAS BEEN AROUND FOR AS FAR AS I CAN REMEMBER, WHY ALL OF A SUDDEN IT HAS TO BE ERADICATED I HAVE THE PLANT IN MY YARD AS AN ORNAMENT BUSH AND I USE THE FRUITS TO MAKE GUAVE ~~OR~~ JELLY, SO IN CLOSING PLEASE RECONSIDER IN RELEASING THAT INSECT, WE HAVE ENOUGH STRANGE BUG'S WORKING IN THE GARDEN

MAHALO

ROY AKITA
855 ALPO ST.
HON. HI 96825

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Roy Akita
855 Aipo St.
Honolulu, HI 96825

Dear Mr. Akita:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about other means of controlling strawberry guava, please see FAQ No. 4. Regarding your comment on the aesthetic impacts of the program, see No. 9. As to your comment about the nature of strawberry guava, please see FAQ No. 1. And regarding your concern about the fruit, see No. 8.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

COMMENTS

From my knowledge as a population biologist, the proposed biocontrol of *Psidium cattleianum* by *Tectococcus ovatus* is long overdue. The efficacy and risks of introducing *Tectococcus ovatus* appear to have been thoroughly studied, and the chance of benefits is monumental, while the risk of deleterious consequences is limited. I can concur with the assessment at:

Summary of environmental assessment findings:

- Strawberry guava...
 - impacts native forests by crowding out and taking over habitat for native plants and animals
 - reduces water availability; where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems
 - threatens cultural resources, such as ancient Hawaiian archaeological sites
 - threatens local agriculture by building a large reservoir of damaging fruit flies
- Populations of feral pigs are unlikely to be affected because they have a diverse diet that relies on a wide variety of forest foods other than strawberry guava
- Current chemical and mechanical control options are limited and unable to address the magnitude of the problem and rate of spread of strawberry guava
- The Brazilian scale insect is a good, safe option for sustainable, long-term management of strawberry guava based on the insect's biology and the results of 10+ years of host-specificity studies
 - 15 years of testing has shown that the bug will only survive on strawberry guava; not on ohia, not on koa, not even on other species of guava.
 - The bug slows down the growth rate of strawberry guava; there will always be strawberry guava trees in Hawaii, but slowing down the growth rate will help save our native forests.
 - The "No Action Alternative" will allow strawberry guava to continue to spread through Hawaii's watersheds.
 - Extensive environmental review has been conducted at both the federal and state level ensuring opportunities for public input

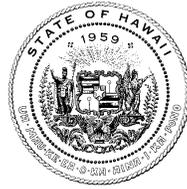
Opponents of the release of *Tectococcus ovatus* have raised all sorts of fears and risks, but I have seen no substantiation with evidence of any of the risks.

Sincerely,

Dr. Lee Altenberg Lee Altenberg, Ph.D.

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Dr. Lee Altenberg

Dear Dr. Altenberg:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hello,

I would like to voice my support for the release of biocontrol for strawberry guava in Hawaii. Strawberry guava is an aggressive nonnative invasive species I see dominating landscapes throughout the Hawaiian Islands, and displacing native species. Release of a biocontrol is the most efficient method for its eradication. I understand that the biocontrol bug in question has been through sufficient research and does not constitute a threat to other nontarget species.

Thank you for your consideration,

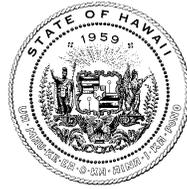
Selita

Selita Ammond
Graduate Research Assistant
Ecosystem Ecology Lab

Department of Natural Resources and Environmental Management
University of Hawai'i at Manoa
1910 East-West Rd. Sherman 101
Honolulu, HI 96822

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Selita Ammond
Department of Natural Resources and Environmental Management
University of Hawai'i at Manoa
1910 East-West Rd. Sherman 101
Honolulu, HI 96822

Dear Ms. Ammond:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I fully support and encourage the expeditious release of the scale insect from Brazil, *Tectococcus ovatus*, for biological control of strawberry guava, (*Psidium cattleianum*).

For almost 10 years I have worked as a biologist, researcher, and natural resource manager throughout the state of Hawai'i. I have worked in the forests of Hawai'i island ranging from lower Puna to Mauna Kea, on Maui in Kipahulu Valley and Pu'u Kukui Preserve, on Moloka'i in forest throughout the island, and on Lana'i at Lana'ihale. I have participated in and supervised field crews on Moloka'i and West Maui where our goal was to control strawberry guava and other invasive introduced plants. I have flown in extensive helicopter surveys on Molokai and Maui and seen the wide extent of Strawberry guava. From my personal on the ground experience I have concluded that current manual control of strawberry guava alone will not work we need additional tools and resources to combat this destructive and aggressive plant I have experienced firsthand thick impenetrable monotypic stands Strawberry guava and observed areas where they have completely replaced the unique and beautiful native Hawaiian forest. Once the forest is gone it is gone forever with it goes our water supply as well as the unique biodiversity of our islands. I have reviewed the science behind the release of *Tectococcus ovatus* and I believe it is a safe tool to protect our native wet forests so future generations can enjoy them in perpetuity.

Thank you for your time
Sam

Samuel N.R. Aruch
Natural Resource Data Solutions LLC
855 W. Kuiaha Rd.
Haiku, HI 96708

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Samuel N.R. Aruch
Natural Resource Data Solutions LLC
855 W. Kuiaha Rd.
Haiku, HI 96708

Dear Mr. Aruch:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha and thank you for allowing me the opportunity to comment on the Draft Environmental Assessment (DEA) for biological control of strawberry guava in Hawaii. I have read it cover to cover. As a hunter on Kauai for more than 10 years, and someone who cares deeply for native forests, I must wear two hats on this issue, one concerning native forests and watersheds and the other concerning what is best for hunting in Hawaii.

In concern of native forests, I will be blunt: biocontrol is absolutely necessary and a sound environmentally friendly means to control our most serious forest weeds including *Clidemia*, strawberry guava, and kahili ginger. They won't eradicate, but rather can reduce weeds to acceptable levels. Biocontrol is preferable to herbicides and is the only option that would work on a landscape level. Therefore, after reviewing the DEA, I support the release of *Tectococcus ovatus* in the Ola'a Forest Reserve.

My larger interests in this are its secondary impacts to feral pigs and hunting.

As a hunter, I prefer not to hunt within major strawberry guava patches, due to their noxious nature. It is fine for when hunting with dog and knife or in many open valley bottoms, but the low visibility makes stalking with firearms and archery equipment unproductive. So while I often hunt around the edges of guava patches, it seems entirely likely that guava would continue to fill in gaps and spread across the entire mountain unless brought under control.

Through communications with the hunting community, most of whom (with or without reading the DEA) disapprove of this project, I can state that there is much concern about losing another important pig food source. This is especially after the loss of rose apple to the accidentally introduced rust fungus *Puccinia psidii*. Being that the state of pig hunting is in somewhat of a slump, I must urge DLNR to explore the possibility of habitat improvement projects for feral pigs, particularly in forest areas that are already alien dominated.

Another concern of the hunting community is that if guava becomes sickly enough, that the weed *Clidemia hirta* will fill in the patches, as it did the rose apple groves. Although unfortunate, the EA explained that this is possible only in small areas relative to strawberry guava's actual range where it is still intermixed with native plants and native plants would likely fill in any gap there. I am also optimistic that *Clidemia* itself will one day be controlled by biocontrols, several of which have already been released with some success. Therefore, although clidemia infestation are possible, I find it no reason to oppose this project, which will have largely a positive impact on Hawaii through preserving native biodiversity, watershed function, and open forest conditions.

I reject the idea that severe reductions in strawberry guava would have positive impacts on the environment by reducing pig numbers, as speculated by many non-hunting environmentalists. Though guava presence in native forests does encourage pig movement to an area, the existing pigs would simply move elsewhere and substitute guava with other food. Rather, the only realistic means of managing pig numbers is to encourage hunting & trapping or to fence & exclude pigs altogether from preserves. Diong noted in his dissertation of feral pigs in Kipahulu, Maui that a 90% reduction in hapu'u consumption occurred during the strawberry guava season,

which lasted approximately 5 months there. He also noted that pigs were not limited by food. However, every pig hunter knows that their meat quality is, so while I agree that a substantial decrease in the pig population is unlikely, pigs' table quality could at least be seasonally affected where dependence on strawberry guava is high. That is only "if" the biocontrol is highly effective. To lose another important food source would be very unfortunate, yet I do not find that risk reason enough to oppose the project which in such case would largely have positive benefits to native forests and agriculture. Instead I must urge DLNR again to explore possibilities for habitat improvement projects that benefit both hunting and conservation.

I must suggest rephrasing the response to the stated concern in table 1:

"It will reduce food for wild pigs, negatively impacting pig populations, pig hunting and the food this produces; alternatively: it may drive pigs into people's gardens and farms to get food."

I thought the response to be somewhat of a slap in the face to very real concerns of the hunting community, which I agree with. However, upon closer analysis, I do not believe it to be reason enough to oppose the project. Instead I suggest validating the hunters' concerns and accepting the uncertainty that *Tectococcus ovatus*, depending on how successful, could reduce available guava fruit for pigs. It must also be acknowledged that the issue of guava feeding pigs is not black & white because **this needless surplus of guava will crowd out other food sources in the long term!** One could speculate that a 60 to 90% reduction would still leave much food for wildlife and that pigs will switch to alternative food sources to compensate for any further shortage. Once again, I must urge DLNR to explore possibilities of habitat improvement projects for feral pigs perhaps utilizing groves of non-invasive fruit trees.

JB Friday's comment on page 15 struck me as particularly interesting because it deals with direct economic impacts of strawberry guava on sustainable koa forestry, a refreshing change from intrinsic values, hunting, and watershed protection.

I see lots of contradiction speculating how effective *T. ovatus* will be in Hawaii but acknowledge that these were discussed in the uncertainties section of page 86. I had hoped for more information about the biocontrol's effectiveness in quarantine conditions as well as tests to see if the predatory insect *Metaphycus flavus* (p. 40) would impact *T. ovatus* in Hawaii. Such info might reduce the uncertainties; however I do not think such information would change my stance on the issue.

In conclusion, I support the release of *T. ovatus* feeling it will positively benefit Hawaii.

Thank you again for the chance to comment,

Nicolai Barca
Kilauea, Kauai

+++++



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Nicolai Barca
Kilauea, Kaua'i

Dear Mr. Barca:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about clidemia biocontrol and pig hunting, you may find relevant information in FAQ Nos. 2 and 7, respectively. As your concerns differed somewhat from those in the list, our responses to your specific comments follow.

1. Concerns about impacts on pig hunting need to be addressed more thoroughly

As noted in the EA there is some uncertainty concerning impacts on feral pigs, given the possible variation in level of impact on fruiting and the variability in diet of pigs, both seasonally and between locations. Although the EA focuses on potential impacts on pig populations, which are considered unlikely, changes in meat quality might also be possible, as you suggest. This entails considerable uncertainty, since we do not know what minimum quantity of strawberry guava fruit might be associated with enhanced meat quality. Even if the biocontrol reduces fruit production substantially, it might not produce a noticeable impact on meat quality if pigs are able to use remaining fruit and other food sources. However, some changes in meat quality may occur in certain environments. Please note that it is extremely unlikely that impacts on strawberry guava fruiting from this biocontrol will be comparable to the severe impacts of *Puccinia* rust on rose apple fruiting, because the effects of this gall-forming insect on strawberry guava plants are much less severe.

2. Replacement of strawberry guava with clidemia

As noted in the FAQs and in the EA, replacement of strawberry guava with other invasive plants is unlikely to occur, especially over large areas, given the moderate impacts of the biocontrol. Again, impacts of *T. ovatus* on strawberry guava are not similar to the severe impacts of *Puccinia* rust on rose apple. We agree that *Clidemia hirta* is extremely invasive and a serious threat to Hawaiian forests. *Clidemia* remains a high priority target for biocontrol research in Hawai'i. HDOA is currently evaluating a new agent which may prove valuable in managing this weed in wet forest environments, so there is good reason to be optimistic concerning clidemia.

3. Possible effects of *Metaphycus flavus*

This parasitoid species is known to attack *T. ovatus* in Brazil and has been recorded to occur in Hawai‘i. However, it does not appear to be common in Hawai‘i, judging from the few times it has been collected. Forest Service researchers so far have not located populations for testing in Hawai‘i, so it remains an open question whether the biotype here would be able to use *T. ovatus*. Although this species is common on *T. ovatus* in Brazil, its occurrence there does not appear to always prevent dense galling of strawberry guava by *T. ovatus*. Thus, even if it turns out to impact *T. ovatus* in Hawai‘i, its presence may not significantly alter effectiveness of the biocontrol. As noted in the EA, potential interactions of this kind contribute uncertainty to whether the biocontrol will be effective.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

This letter is to voice my support of the planned release of the insect *Tectococcus ovatus* in Hawaii'i. Those who oppose this release claim they want to safeguard Hawaiian forests by blocking the release of this insect. This is a ludicrous proposal in light of the dominating impact of strawberry guava in remaining forests of Hawaii. Research by very competent professionals in Hawaii and Brazil has followed a rigorous scientific process to identify a specialized natural enemy of the strawberry guava, and this release is being blocked by a few very vocal citizens who are spreading false information, including fear tactics.

The professionals I mentioned can be likened to a surgical team working to correct an illness, in this case the cancerous spread of this South American tree. I trust this group of highly trained biologists have found a very low risk solution to the problem, and they have presented far more compelling arguments than a few vocal naysayers trying to save the guava. Ironically, Hawaii is known as the extinction capital of the world thanks to pests like strawberry guava, and the remaining naïve species are being totally overlooked for a small quantity of economically unimportant free fruits.

Also important to consider is that legislative action to block this biocontrol release – a common invasive species management tactic in much of the world - sends an embarrassing message about the values of Hawaii's residents, who would be seen as choosing this Brazilian tree over the native and most endemic flora of the world. This is certain to be shameful in front of the local, national and international community

Thanks for your consideration and time.

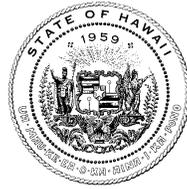
Sincerely

David M. Benitez

Volcano, Hawaii.

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David M. Benitez
Volcano, Hawai'i

Dear Mr. Benitez:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I am writing in support of introduction of the scale insect for biocontrol of strawberry guava. The sooner this project begins, the better.

My husband purchased an acre of land in upper Leilani Estates in Puna makai on the Big Island over 30 years ago. His recollection was of a rain forest composed primarily of ohia, kolea, hapu'u and a few kukui nut trees, but when we arrived 25 years later to build our retirement home here, the predominant tree species was strawberry guava.

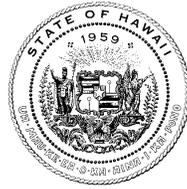
It took us nearly a year to remove the guava. We were able to cut up a lot of the limbs into firewood and give away to Volcano residents, but the roots and branches all had to be hauled to the yard waste bins in Kea'au and Hilo. We soon learned that the tiniest root or branch left behind would soon regenerate into a tree. We used chains on the bumper of our truck to pull out many of the roots. However, in many cases the guava was wrapped around the ohias. I am an organic gardener and had never used a pesticide, but a systemic poison was the only method we could find to kill the guava without also disturbing the roots of the ohia. Despite all our efforts, five years later we are still having to go back to some of those old guava stumps and poison them again, and we are constantly having to cut back the guava that encroaches our lot from neighboring vacant lots. We have also hauled in a lot of gravel to fill the mudholes left by *waiawi*.

My experience of the people who are opposed to introduction of a biocontrol is that they have little notion of what a native Hawaiian forest looks like. Many live on bulldozed land where the only tree species are invasive. All they have is guava and they have never tried to eradicate it. If they had, they would understand that we need as many tools as possible to protect the native forests here from being swallowed up by this Brazilian fruit tree. Please conclude your studies as quickly as possible and commence this project.

Mahalo,
Bett Bidleman
13-1264 Malama St.
Pahoa, HI 96778

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bett Bidleman
13-1264 Malama St.
Pahoa, HI 96778

Dear Ms. Bidleman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 24, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the kind of hard work you have done removing strawberry guava, the proposed biocontrol agent would provide another critical tool for managing this invasive plant and making your efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To: Dr. Neil Reimer, Hawaii Department of Agriculture
cc: Ron Terry; Paul Conry

Dr. Reimer,

I am contacting you to express support for release of the *Tectococcus* scale in Hawaii as a means to mitigate invasion from the serious pest strawberry guava.

Having read the research involved in determining this natural enemy from the same habitat as the pest plant, I have total confidence in the host-specificity of this insect and understand that, through stringent non-target testing, this scale will not affect other members of the same plant family growing in Hawaii. These plants include ohia, ohia ha, Mountain apple, Eucalyptus, and even common yellow guava.

While opponents to this release will cite various examples of why this is a bad move for Hawaii, I challenge their views based on actual review of the facts. I sincerely doubt that the opposition has actually read all the facts, nor do they have an understanding of host-specificity of insects and the millennia of time involved in any potential evolutionary changes they perceive.

In general, I believe you will find that most of your opposition comes from segments of our community that inherently have a strong distrust of government and science. This distrust, in my opinion, is what has led to widespread misinformation concerning the potential release.

Though I respect their rights to disagree on this pressing topic, I have yet to see any challenges that are reality-based. For those citing this release as a threat to Hawaiian culture, I fear they do not really understand the strong relationship between true Hawaiian culture and balance in the environment and plant world that this culture relies upon.

Over the last few decades, I have personally witnessed natural areas rich in native flora become monotypic stands of strawberry guava. There are other invasive plants as well that can literally take over these areas, without the precedent of disturbance to invite their dominance. Although physical control of these pest plants can delay their ultimate impact to our forests and watersheds, I can cite from experience that this physical control (including the careful use of herbicides) will not realistically address control of strawberry guava in remote areas, where it is the greatest threat.

Therefore, we need to balance the competitiveness of such plants with the natural enemies that help keep them in check in their own natural habitat. Having personally seen strawberry guava growing in its' native Brazil, I have seen how only occasional trees occurs there—it does not grow into dog-hair thickets as we see in Hawaii.

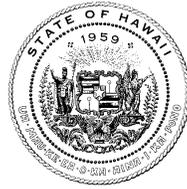
To take the aggressive behavior of strawberry guava down a couple notches by employing the responsible use of a natural enemy is the best option and most responsible choice that can be made to preserve our intact native forests and watersheds.

Mahalo for your perseverance with this hot topic!

Pat Bily

223 Upper Kimo Drive, Kula, Hi. 96790---(808) 878-2441

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Pat Bily
223 Upper Kimo Drive
Kula, Hi. 96790

Dear Mr. Bily:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Carolyn Blackburn
4106 Black Point Road
Honolulu, HI 96816



July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is necessary to protect Hawai'i's native forests.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

O'ahu's forests should be dominated by native species such as 'ohi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that 'ohia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ohi'a and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawai'i's

native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

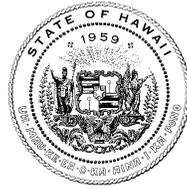
T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai'i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give 'ōhi'a and koa seeds a chance to sprout.

Like Hawai'i's language and culture, Hawai'i's forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava's natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,
Carolyn Blackburn

A handwritten signature in black ink that reads "Carolyn Blackburn". The signature is written in a cursive style and is followed by a long horizontal line that extends to the right.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Carolyn Blackburn
4106 Black Point Rd.
Honolulu, HI 96816

Dear Ms. Blackburn:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. The threats posed by strawberry guava are indeed very real. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To: Hawaii Department of Agriculture, Plant Pest Control Branch

As a private land owner on Kauai with a small orchard I am inclined to voice my opinion against the introduction of *T. ovatus*. Testing the effects on a mere 80 species hardly warrants the release of this bug. The direct and secondary impact on both plants and animals could never be determined from studying such a small pool of species.

I have concerns that *T. ovatus* will adversely effect the health of my wide range of fruit trees. The health of birds or possibly my homestead chicken flock could be plagued by feeding on this insect. How will direct exposure to *T. ovatus* render my health after years of fruit harvest? It has been suggested that *T. ovatus* might have highly allergenic properties.

Alternately, reestablish the use of strawberry guava in local jams and/ or pies. Manually dig out the trees that are accessible and reforest with native species. I would gladly volunteer my own time to help with either of these alternatives, if I knew doing so would help prevent the introduction of *T. ovatus* to Kauai.

The risk of introducing yet another species to Hawaii's delicate ecosystem is to great, when there are viable alternatives.

Respectfully,

Irmali Boday

Irmali Boday

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

November 1, 2011

Irmali Boday

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

Dear Ms. Boday:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 24, 2010, on the Draft EA in which you express concerns about possible impacts on your fruit orchard and chickens. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about manual clearing and the safety of the biocontrol, please see FAQ Nos. 4 and 5, respectively. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, this organism spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment. Similarly, chickens are unlikely to encounter this insect in any significant quantity because of its enclosure in leaf galls. If chickens did take an interest in consuming tiny dead scale insects inside leaves that fall to the ground, there is no reason to believe that this would be harmful to them or you. In fact chickens readily feed on insects that they find while foraging without suffering any ill effects.

Finally, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

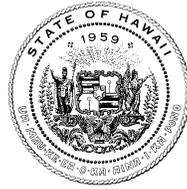
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To whom it may concern considering the Strawberry guava situation. I Sharon Boll of Kapahi Kauai wish to acknowledge and respect all effort and parties involved, and the tremendous gravity of this problem. Please consider:

- Keep Tectococcus in Brazil - where it belongs !!!
A scale insect from Brazil is not the answer. It is a "fix" which will likely backfire. Ask your Grandfather, accomplishment comes thru concentrated effort and work, like it always has.
- It's highly allergic ... Hello !?!? "may induce severe allergic response"
- "51 Biocontrol species have been introduced ... None have resulted in the eradication of it's host." Hello !!
- Start by reactivating the Ahupua'a watershed and removing Strawberry guava from these areas first. Then move on to existing areas. Remove what you don't want, add what you do want ... and maintain.
- Water and cultural sites must be managed by well paid land stewards. Our government seems to have the money for everything else!
- Create nurseries and jobs for Hawaiian and local people. Grow indigenous species - and food, then replace them with invasive species. Educated and aware people know this is the answer. Replace the canopy so the forest can maintain.
- Worse yet is the ever invasive cane / ginnie grass which our government is doing nothing about because thru loss of culture (genocide), and a money system we no longer malima the 'āina!
- Good job Tracy Johnson - someone is thinking!
Human survival depends on our ability to live in harmony with nature. Do not introduce another invasive specie! Hire humans, who need jobs to manage the land and water systems. Simple, sustainable, common sense. Our only option, Christy Martin is to manage our forestland !!

I can be reached at
652-9727

Mahalo, Sharon Boll



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sharon Boll
Kapahi, Kauai

Dear Ms. Boll:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 29, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about biocontrol efforts, please see FAQ No. 3. Regarding your comments about manual eradication and other species more suited for biocontrol, please see FAQ Nos. 4 and 2, respectively. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

2. Biocontrol goals.

The purpose of biocontrol is not to eliminate a pest, but to suppress its population. Similarly, *T. ovatus* will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To: HAWAII Department of Agriculture Plant Pest Control Branch --

I support Bio control of strawberry guava. The sooner the better!

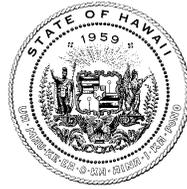
The science is good and it will help save our native Hawaiian forests and our water supply.

Sincerely,

Heidi Bornhorst
Hawaiian Horticulturist and Arborist

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Heidi Bornhorst
Hawaiian Horticulturist and Arborist

Dear Ms. Bornhorst:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 16, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native species in Hawai'i, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box 1077
Honokaa, Hawaii 96727
(808) 7751063

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

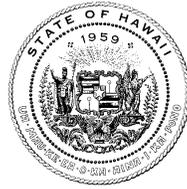
I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.



HARRISON BOTELHO

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Harrison Botelho
P.O. Box 1077
Honokaa, HI 96727

Dear Mr. Botelho:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dear Dr.Reimer;

The Department of Agriculture’s proposal to initiate a strawberry guava biocontrol program seems very reasonable and well thought-out. I am reasonably familiar with DOA's biocontrol program and the many safeguards followed to minimize the unintended consequences of using biocontrol agents to manage invasive species. The few instances of unintended consequences that critics point to when discussing the use of biocontrol agents occurred many, many years ago. The Department of Agriculture’s biocontrol program has matured under the able direction of many dedicated staff members. I have great confidence in your ability to institute a successful (and needed) biocontrol program for strawberry guava. You've already demonstrated that *Tectococcus ovatus* will not attack desirable plants. It's time to begin releasing this very effective scale.

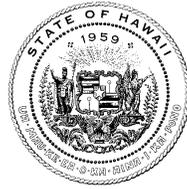
The reasons given by opponents of the proposed program seem specious to me. There will be no shortage of strawberry guava for their personal consumption. The rights of individuals who are concerned with the protection of native vegetation and ethnically important plants must be weighed against “rights” of the relatively few who want to harvest strawberry guava as a food crop. They are naysayers who have put their own personal interest above that of the rest of Hawaii’s residents. The State has an obligation to protect our natural resources (including watersheds) against this invasive pest. Arguments against the proposed biocontrol program are not scientifically based or even reasonable.

I believe the Environmental Assessment addresses all legitimate concerns and should be approved before strawberry guava can further damage our environment.

Sincerely,
Barry M. Brennan, PhD
Extension Agrosecurity Coordinator
College of Agriculture and Human Resources
University of Hawaii at Manoa

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Barry M. Brennan, Ph.D.
Extension Agrosecurity Coordinator
College of Agriculture and Human Resources
University of Hawai'i at Manoa

Dear Dr. Brennan:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To Whom It May Concern:

Aloha. I am writing IN SUPPORT of the release of the strawberry guava biocontrol. I feel comfortable with the research and I believe we must do something to save our native forests. This tool will help slow the spread of this invasive weed into our native forests. Who could oppose that?

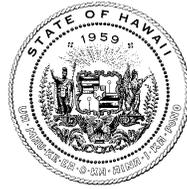
I know that scientists working on this project would not support the release of a biocontrol without extensive research and a strong sense of safety and effectiveness documented through years of research. Their love for our Hawaiian forests is no less than my own. I believe they want to help our native forests and that is a worthy cause, no matter what happens in people's yards.

I support this project to control the invasive strawberry guava by its native control insect.

Respectfully,
Jill Briggs
Kaneohe HI

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jill Briggs
Kaneohe HI

Dear Ms. Briggs:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



West Maui Mountains Watershed Partnership

July 19th, 2010

RE: Testimony in support of proposed field release of *Tectococcus ovatus*,
Psidium cattleianum biological control

To: Hawaii Department of Agriculture,
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Aloha Dr. Reimer,

The landowners of West Maui Mountains Watershed Partnership strongly support the biological control of strawberry guava, *Psidium cattleianum* Sabine (Myrtaceae), and the proposed field release of *Tectococcus ovatus* Hempel (Homoptera: Eriococcidae) in Hawaii by the United States Department of Agriculture.

As the landowners and managers of the West Maui Forest Reserve, our collective mission is to prevent degradation of the native Hawaiian forest and its watershed function which provides a clean and reliable source of water for Maui's domestic, agricultural and industrial use. To that end, we believe that biological control of strawberry guava is severely needed to assist us in daunting challenge of controlling such an aggressive weed which has already inflicted significant damage to our watershed.

Here in West Maui we have witnessed first hand how strawberry guava can displace native forests with single species monotypic stands, displace endangered species habitats, render vast sections of land susceptible to erosion, exhibit broad habitat preferences, spread to the most inaccessible areas, and advance steadily from low elevations toward the pristine core of our forested lands. Furthermore, we are greatly concerned about its potential to consume greater quantities of water than our native species at a time in our history when rainfall trends are decreasing and the demand on our water resources continues to increase.

Since its introduction to the islands in 1825, strawberry guava has grown to become a dominate species within roughly 3-5 thousand acres of West Maui's Forest Reserve and adjacent conservation lands. It is by far the, single most aggressive and troubling weed

West Maui Mountains
Watershed Partnership
P.O. Box 13240
Lahaina, Hawai'i 96761
Phone (808) 661-6600
Fax: (808) 661-6604
westmauiwatershed.org

Watershed Partners

County of Maui
Dept. of Land &
Natural Resources
Ka'anapali Land
Management Corp.
Kahoma Land Co., LLC
Kamehameha Schools
Makila Land Co., LLC
Maui County
Department of Water
Supply
Maui Land & Pineapple
Company Inc
Wailuku Water Co.,
LLC
The Nature
Conservancy of Hawaii

currently in our watershed. Currently, strawberry guava is abundant in many places in West Maui up to 2000 feet elevation, has strong satellite populations up to 3,000 feet, and is known to exist over 4,000 feet in elevation. The summit of the West Maui Mountains at Pu'u Kukui stands at 5,788 feet and strawberry guava has been known to grow in elevations approaching this level on other islands. Given enough time and left unchecked, it seems entirely possible that strawberry guava could consume vast expanses of our watershed. Even the most severe terrain and inaccessible reaches of West Maui has been colonized by guava and it is here where biological control is our only option.

It is anticipated that the use of the *Tectococcus ovatus* biological control will allow us to efficiently and cost effectively protect the watershed from further degradation from strawberry guava. If successful it will also help to sustain the many and highly valued ecosystem services that watersheds provide to the people of Hawaii.

While we recognize that strawberry guava is appreciated as a food and fuel source for some, we weigh and balance this against the tremendous threat that it poses to our islands sustainability. Native forests provide a vast array of cultural elements which we cherish and provide water resources upon which we are dependant. We fully support the proposed field release of *Tectococcus ovatus*.

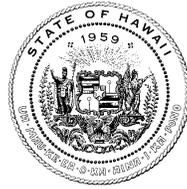
Sincerely,



Christopher N. Brosius
Watershed Coordinator
West Maui Mountains Watershed Partnership

CC:
Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325, Honolulu, Hawaii 96813

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Christopher Brosius
Watershed Coordinator
West Maui Mountains Watershed Partnership
P.O. Box 13240
Lahaina, HI 96761

Dear Mr. Brosius:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating West Maui Mountains Watershed Partnership's support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha no,

I would like to voice my strong support for introducing a biological control for strawberry guava. I have seen the effects this invasive tree has on our native forests, and I think the State and our communities should do all they can to limit further spread of this species. Strawberry guava has been shown to take up valuable water from our native watershed forests, especially in times of draught. Species diversity, watershed functionality, and perpetuation of Hawaiian cultural resources are dependent upon maintaining healthy native forests.

I have come to understand and trust the protocol for studying, introducing, and documenting the effects of biological control species, and I am a strong supporter for this method of action.

Biocontrol is a last resort, when experts realize that manual and chemical means are no longer viable options for protecting Hawaiian ecosystems. I believe biocontrol is an appropriate and necessary measure we need to take to protect our watershed forests from further devastation by strawberry guava.

Respectfully,

Andrea Buckman
Project Coordinator
Leeward Haleakala Watershed Restoration Partnership
P.O. Box 652, Makawao HI 96768
www.lhwrp.org
www.auwahi.org
(808) 573-8989

Aloha,

I want to voice my support for introducing biocontrol for strawberry guava. I feel protecting our native forests, biological, cultural, and water resources should be a major priority. This introduced tree threatens all of the above, and biocontrol has now become the only viable option for protecting native watershed forests. Those who eat from the strawberry guava tree will likely not be affected because the introduction will occur in forested areas, not residential areas. This will not threaten our food availability or freedom to grow our own food. The forests are for the greater good, and protecting them is crucial.

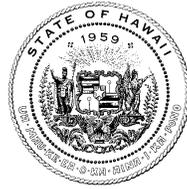
Please allow introduction of the biological control for strawberry guava.

Sincerely,
Andrea Buckman
PO BOx 1643 Makawao, HI
281-6836

No rain, no rainbows!

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Andrea Buckman
P.O. Box 1643
Makawao, HI

Dear Ms. Buckman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 23, 2010

Dr. Neil Reimer
Hawai'i State Department of Agriculture,
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawai'i 96814

Dear Dr. Reimer,

Aloha

The Maui Restoration Group originated in 1997 as a grass-roots organization dedicated to saving endangered forest tracts that are culturally important and biologically unique. This group has evolved in project complexity, the scale of volunteerism, the evolution and effectiveness of emergent restoration technology, and the realization of the critically important role of the general public in saving natural areas. The restoration of Auwahi dryland forest has been one of the primary focuses of the Maui Restoration Group for the last decade.

To honor the MRG's mission and goal to protect Hawaiian forests, we fully support and encourage the release of the carefully tested strawberry guava (*Psidium cattleianum*) biological control agent, *Tectococcus ovatus*, by the U.S. Forest Service.

Respectfully submitted,

Andrea Buckman

Maui Restoration Group
www.auwahi.org
808)573-8989

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Andrea Buckman
Maui Restoration Group

Dear Ms. Buckman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

June 24, 2010

To whom it may concern:

I would like to offer my support for proposed Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands. It is well known that native species have little ability to out-compete this pernicious species. Conservation of Hawaii's native forest would be helped by the release of this well tested Tectococcus scale, they have shown that native species are not attacked, and all of this using the best available science. Such methods have proven successful around the world for biocontrol efforts in the last few decades. Biocontrol efforts are known to be successful (no non-target impacts) since 1975, a good safety record to date. Recent efforts to control the Wiliwili gall wasp using biocontrol shows that biocontrol does have a place in the conservation of Hawaii's natural resources now and into the future.

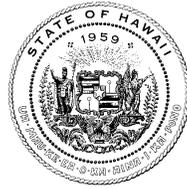
Evidence suggests that the gall wasp will reduce fruit production of strawberry guava, but not other guava species, a further indication of its specificity.

Sincerely,

Chris Buddenhagen
2121 Algaroba St #605
Honolulu HI, 96826
808 343 9515

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Chris Buddenhagen
2121 Algaroba St #605
Honolulu HI, 96826

Dear Mr. Buddenhagen:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 26, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I'm sending you this email to state my concern about this release, I am along time hunter and have seen a lot of change in our forest in the last 7 years. The Rosie Apple tree has been killed off from the "Rust" and the animals that i hunt are very skinny....VERY...the guava that falls is the only thing that is keeping them alive in certain areas of the island...now if the guava shuts down don't you think that these pigs will turn to something else?... like our native plants and resort to digging even more to get to roots that they would normally not do Me and my family strongly oppose this release and hope you all think long and hard about the other "Good Ideas" the state has had in the past (mongoose,cane frogs,etc...). Isn't there some way we can create jobs to clear these thickets put people to work like they did in the 40s when they created the summit trail system to acquire funds from the Federal Government? Also what happens when the guava is gone do you think the scale will just die...? I highly doubt it ...it will evolve to eat something else, maybe a native species that we are trying to save.

My name is Chris Burner and I strongly oppose

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Chris Burner

Dear Mr. Burner:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 23, 2010, on the Draft EA in which you express your concerns as a hunter. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the diet of feral pigs, please see FAQ No. 7. Regarding the issue of biocontrol in general, we refer you to FAQ No. 3. As for manual control of strawberry guava and information about whether the scale insect will switch to other hosts, see FAQ Nos. 4 and 5, respectively. As one of your concerns differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. With less strawberry guava, pigs might switch to other food sources.

While wild pigs do make use of strawberry guava seasonally, studies of feral pig diets in Hawai'i have found that other plant materials make up most of their diet. The varied diet includes a significant consumption (over 50 percent) of ferns and grasses, as well as earthworms and carrion for protein. Because less dense stands of strawberry guava would promote better human access, it might even be possible that hunting success could be increased by the biocontrol action (pp. 64-65). Without discounting the importance of pigs for subsistence in Hawai'i, feral pigs are not natives and are generally recognized to be deleterious to native ecosystems. Pigs already reach high densities and cause substantial damage in some forest areas without strawberry guava, so managing pig damage to native ecosystems and adjacent private property remains a significant challenge regardless of the outcome of strawberry guava biocontrol.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

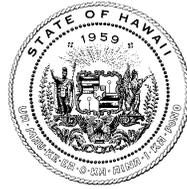
I am writing in regards to the planned release of an insect being introduced in order to control the burgeoning strawberry guava tree population on the Big Island. Please do not release this foreign species to any of the Hawaiian Islands. I understand that the guava is a nuisance, I will donate time and money to help chop them down, but this insect is NOT the answer to the problem.

Please, please do not release this insect. I will personally hold fund raisers in order to support other means!

Thank you,
Laura Burney
Nanakuli, Oahu

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Laura Burney
Nanakuli, Oahu

Dear Ms. Burney:

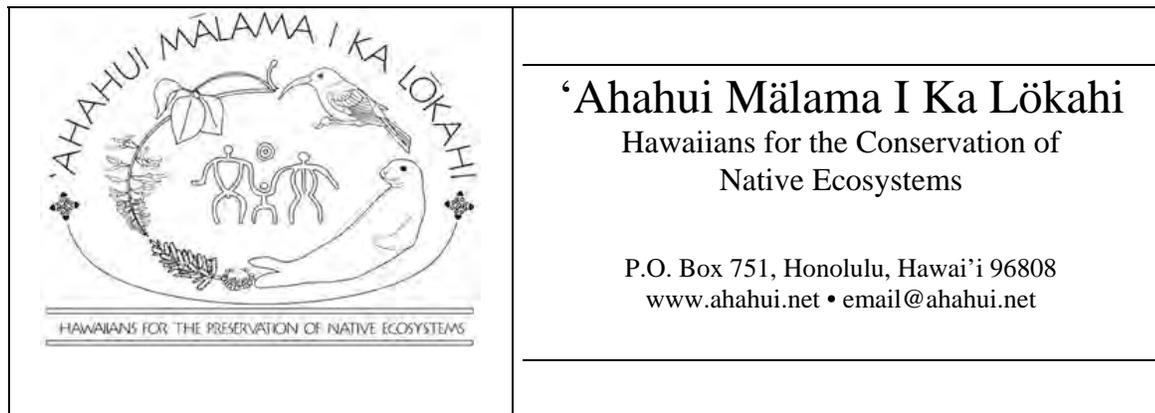
**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your comment letter dated June 28, 2010, on the Draft EA expressing your opposition to the biocontrol release and your offer to assist in manual eradication of strawberry guava. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about manual eradication, please see FAQ No. 4.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



July 23, 2010

Hawaii Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, HI 96814

‘Ahahui Mälama I Ka Lökahi, Hawaiians for the Conservation of Native Ecosystems, supports the plan to release a carefully tested natural enemy of strawberry guava, which has proved to be so damaging to Hawaiian culture and Hawaiian species. Strawberry guava is so aggressive it dominates the sunlit spaces of many forest areas, and is considered a pest by all but a few. Evidence from host specificity testing and observations of the host range of *Tectococcus ovatus* in Brazil indicate that this biocontrol agent will attack only the target weed *P. cattleianum* in Hawaii. *Tectococcus ovatus* is expected to cause reduced vegetative growth and reduced fruit and seed production, decreasing the spread of strawberry guava over a period of years. Impacts of *Tectococcus ovatus* on strawberry guava are expected to have major economic benefits including improved control of pest fruit flies, increased effectiveness of mechanical and herbicidal control, and long-term protection of vulnerable native forest ecosystems from one of their most serious threats. Impacts on native Hawaiian species, including many endangered rainforest species, are expected to be highly beneficial due to significant reduction in the threat of strawberry guava to native forests.

No native or alien tree species are known which can grow up through it and shade it out. In ranchlands where it shades out good forage grasses, there are generally no cheap ways to kill the trees.

In Brazil, Strawberry guava usually occurs as scattered individual trees and rarely in small clumps, but due to a lack of natural enemies here, it forms large single-species stands in native forests, and breaks up natural areas and disrupts native animal communities, so it is considered one of the greatest threats to endangered forest birds on all the major Hawaiian Islands

(USFWS 2003). Native birds and insects are closely adapted to using native tree species, and most cannot utilize stands of strawberry guava. Use of fruits by invasive animals facilitates spread of seeds and helps sustain non-native animal populations that damage native ecosystems extensively. Beyond Hawaii, strawberry guava is recognized as a major threat in native rainforest ecosystems in Mauritius, Reunion, the Seychelles, the Society, Fiji, Norfolk, Palau, and Fatu Hiva, so local results can be much applied there.

We see the plants ability to resprout from cut stems makes repeated control efforts necessary, and it has been recognized as an impediment to sustainable koa harvests, because scholar (Dobbyn, 2003) saw many areas disturbed by logging are colonized by strawberry guava more quickly than by koa .

Environmental benefits of *T. ovatus* release are expected to occur gradually over a period of decades and to be highly beneficial to nontarget species in helping protect large areas of native forest from being invaded and dominated by strawberry guava, and contributing to large scale control of pest fruit flies. It is most positive that all laboratory tests and field observations indicate that *T. ovatus* is highly specialized to utilize only strawberry guava and closely related species within the genus *Psidium*. These data all suggest host shifts by this introduced weed biological control agents to unrelated plants will be extremely unlikely) and the harm of not using it is evident in 100s of sites statewide.

Release of *T. ovatus* is expected to help habitats of rare, threatened, and endangered species quite positively by limiting further degradation of native forest areas, but if no action is taken, decline in endangered plant populations are probable and extinctions are possible. A few examples: *Viola oahuensis* , *Cyanea superba*, *Urera kaalae*.

We are very positive on the high quality of the science and breadth of the draft environmental assessment and the long dedication to a successful project for the island forest now so besieged by continental invasions. We are pleased it is most effective only at high elevations of the host plant's range. This is a particularly attractive characteristic for Hawaiian forest managers because the remnants of native forest are often confined to upper elevations. The level of detail in the draft assessment is excellent information to make a sound decision and the host specificity test results were impressive and acceptable. We note the planned release is strictly contingent upon six or more government permit approvals and various other requirements.

We cite two key reports in support of this release:

Jacobi, J. D. & Warshauer, F. R. 1992. *Distribution of six alien plant species in upland habitats on the island of Hawaii*.

Vitorino, M. D., et al., 2000. The biology of *Tectococcus ovatus* ...and its

potential as a biocontrol agent of *Psidium cattleianum* .in . Proceedings of the X International Symposium on Biological Control of Weeds, 1999, Montana State University,

We strongly urge all agencies to permit the release of *Tectococcus ovatus* onto Hawaii lands.

Sincerely,

Charles K. Burrows, Ed.D., Co-President
'Ahahui Malama I ka Lokahi
P.O. Box 751
Honolulu, Hawaii 96808

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Charles K. Burrows, Ed.D., Co-President
'Ahahui Mälama I Ka Lökahi
P.O. Box 751
Honolulu, HI 96808

Dear Dr. Burrows:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating that 'Ahahui Mälama I Ka Lökahi, Hawaiians for the Conservation of Native Ecosystems, supports the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Joan E. Canfield
42-129 Old Kalaniana'ole Road
Kailua, HI 96734
July 22, 2010

TO: Hawaii Department of Agriculture, Plant Pest Control Branch
RE: Draft Environmental Assessment: Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Aloha Ladies and Gentlemen,

I am writing **in support** of the Draft EA's Finding of No Significant Impact, and urge the DLNR to grant the permit for release and monitoring of *Tectococcus* in Hawai'i forests for the purpose of controlling the invasive pest, Strawberry Guava.

I am a botanist with 30 years' experience working to understand and protect Hawai'i's native ecosystems. I am currently serving a second term on the Hawai'i Legacy Land Conservation Commission, which is charged with selecting valuable lands for purchase by the state. Serving on this Commission has put into high relief the critical issues affecting our aina. With our mandate to focus on legacy – the long term – an overarching concern is control of the most aggressive invasive species, notably Strawberry Guava. Why should we recommend spending millions of state taxpayer dollars to protect watersheds, cultural and historical sites, rare species habitat, ocean access, open space, and viewplanes, if they will be overrun by Strawberry Guava ?

Thus the crucial importance of biological control of Strawberry Guava. To underscore my belief that the release of *Tectococcus* in Hawai'i is not a dangerously risky proposition, let me share my experience with the depth of scientific understanding and breadth of support behind the concept of releasing *Tectococcus*.

From 1998 to 2000, I served as Deputy Director of the Pacific Island Ecosystems Research Center, in the Biological Research Division of the US Geological Survey. I was also the Federal Unit Leader of the Pacific Cooperative Studies Unit (PCSU) at the University of Hawaii. My duties included oversight of our interagency program on biocontrol.

I traveled to Brazil and was briefed by our in-country research partners at the University in Curitiba, where *Tectococcus* was being reared and studied, and was being tested for potential negative effects on Hawaiian native plant species. I was impressed by the caliber of Brazilian scientists working on this project, and by the excellent rapport they had with the lead scientist and administrator in Hawaiian biocontrol, Dr. Clifford Smith (UH Manoa Dept. of Botany Professor and former Unit Leader of PCSU), who accompanied us on the trip. We also visited a number of field sites, including montane and coastal areas where

Tectococcus was evident on native Strawberry Guava populations.

Here in Hawai'i, our interagency biocontrol group met numerous times to plan for the most prudent and effective means of controlling the highest priority invasive species. The potential for *Tectococcus* to play an important role in knocking back Strawberry Guava was recognized by all parties. These included administrators and scientists from state and federal agencies and non-profit conservation organizations.

A far broader community of interested parties stood behind the use of *Tectococcus* to control Strawberry Guava. I worked closely with the island Invasive Species Committies (ISCs) on Maui, O'ahu, and the Island of Hawai'i (Kauai's ISC had not yet formed). These groups, which include county agencies and interest groups, utilities and commercial concerns, as well as state, federal, and non-profit entities, recognized the crucial role that biocontrol must play in invasive species management. The ISCs were strongly in favor of advancing *Tectococcus* biocontrol of Strawberry Guava.

I have detailed all this history to emphasize the depth and breadth of support for this particular biocontrol issue. The groups I have mentioned include a number of nationally acclaimed scientists who have a history of extremely circumspect reaction to biocontrol in Hawai'i. We are all too familiar with the horror stories from the past! And that is exactly why the release of *Tectococcus* is so crucial. The fact that it has passed muster with these concerned parties speaks volumes. It is recognized as safe for native organisms and vitally important as part of our arsenal to prevent aggressive invasives from decimating Hawaii's native ecosystems and watersheds.

As the Draft EA details, *Tectococcus* biocontrol has been amply vetted by HDOA and the US Department of Agriculture APHIS program. I urge the DLNR to act in concert with these highly reputable bodies and grant the permit allowing the release and monitoring of *Tectococcus* for the good of the aina. The survival of Hawai'i's precious native forests and unique species hangs in the balance, as does the health of the watershed that the state's population depends upon.

Thank you for your consideration.

Aloha no,

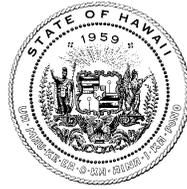


Joan E. Canfield, Ph.D.

Commissioner, Hawai'i Legacy Land Conservation Commission

Affiliate Graduate Faculty, Ecology, Evolution & Conservation Biology Program, UH Manoa

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Joan Canfield
42-129 Old Kalaniana'ole Rd.
Kailua, HI 96734

Dear Ms. Canfield:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 22, 2010

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Dear Dr. Reimer:

I am writing in support of the draft environmental assessment (DEA) done with regard to biocontrol of strawberry guava by its natural control agent for preservation of native forests in the Hawaiian Islands. In reviewing the DEA, I found it to be well-reasoned and addressing comprehensively the release of the agent *Tectococcus ovatus*. It is clear from the DEA that many years of research have gone into testing this agent and its availability as a tool to manage strawberry guava is critical for several reasons:

- **Preservation of the native flora and fauna.** Healthy, diverse native forests are critical for the collection and absorption of water into our aquifers (which provide 99% of our state's drinking water). Strawberry guava greatly degrades native forests and destroys their functionality;
- **Conservation of Native Hawaiian culture.** Strawberry guava impacts many native habitats and species which perpetuate Native Hawaiian culture;
- **Threat to local agriculture.** With sustainability a concern for most island residents, supporting local agriculture is important. However, strawberry guava is a reservoir for fruit flies, which can significantly impact crops;
- **Cost effective.** Physical, mechanical, and chemical controls are available as tools to combat strawberry guava. However, these tools have their limits with regard to labor required, cost, and reach (e.g. inaccessible terrain). It would take millions to control the spread of existing as well as future populations of strawberry guava into critical watershed areas. *Tectococcus ovatus* would be a cost-effective method to control such populations for government agencies, non-profit organizations, and land owners;
- **Control expansion of range.** The agent will not eradicate strawberry guava, but merely give land and resource managers another tool to help with control of it I native habitat areas. For those who use the wood or eat the fruit, strawberry guava will not be gone as a resource for these uses.

As Art Medeiros of USGS said in a recent Honolulu Star Advertiser article, "the house is on fire, and we're arguing about whether the carpets are going to get wet." For these reasons, I urge the approving agency (Department of Land and Natural Resources, Division of Forestry and Wildlife) to issue a FONSI for the final EA.

It is my hope that the HDOA continues to support this and other biocontrol initiatives that have been equally well-tested, thought out, and have clear benefits for the residents of our state and our unique natural resources.

Sincerely,



Vickie Caraway
849 Kealahou St
Honolulu, HI 96825

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Vickie Caraway
849 Kealahou St.
Honolulu, HI 96825

Dear Ms. Caraway:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box
Honokaa, Hawaii 96727
(808)

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

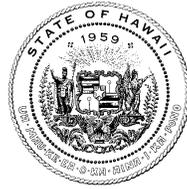
Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.

Gayleen Carnaga

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jayleen Cariaga
Honoka'a, HI 96727

Dear Ms. Cariaga:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To: State of Hawai'i, Department of Agriculture

I've been hiking in Hawaii's forests for more than 40 years. In my neighborhood on Tantalus, I have seen the mountain taken over by waiawi. On the Manoa Cliff trail one once walked a path bordered by maile, hapu, koa, 'ie'ie, mamaki, lovely fragrant white hibiscus and ohia. All of the native plants have been forced out; there is now a monoculture of waiawi. It has been years since I have seen people heading up the trails to pick native plants for hula. It's so sad, and a complete negation of the Hawaiian ethic to malama the aina.

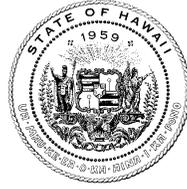
I love waiawi products too, but not at the expense of our native flora and fauna. Every year I make waiawi jelly for friends and family. The strawberry guava trees on my property are full of fruit right now and I'm looking forward to a big harvest. But after that I'm getting rid of these trees. My selfish desire to make jelly should not trump our obligation to preserve what is left of the endemic forest. (Besides, there are yellow guavas.) I strongly support the biocontrol of strawberry guava. And as for the man on big island who is opposing this and has a coqui frog preserve – he is out of his mind! No one should be allowed to harbor invasive species. Would the State allow a preserve for brown tree snakes? Please don't be swayed by those views.

Mahalo,

Marilyn Carlsmith

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Marilyn Carlsmith

Dear Ms. Carlsmith:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

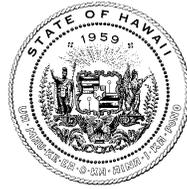
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Mahalo for moving forward with bio control for Strawberry Guava. Please do it soon while we still have a forest to save - we have lost so much forest in a very short time near my parents home on the Big Island.

Aloha,
Rhiannon Chandler
(808) 389-8680

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Rhiannon Chandler

Dear Ms. Chandler:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 24, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To whom it may concern,

I planted several strawberry guava trees as well as the slightly larger yellow guava with similar type of leave in my yard over 20 years ago. I selected these trees after I saw them in beautifully landscaped hotel grounds and yards throughout Hawaii.

These trees are beautiful when they are trimmed and shaped, Looking at these trees while standing or sitting in their shade has such a peaceful and calming effect.

What would happen to the various businesses that use the fruits for jams, jellies, and juices? I'm sure many homemakers, hikers, hunters, landscapers, consumers and others would be sad or upset to have these plants eradicated.

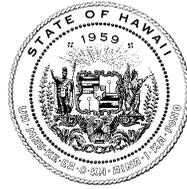
I appreciate me trees even more today because they provide a partial barrier from my inconsiderate noisy neighbor and his friends. I can;t imagine my yard without these trees.

I understand the intent of the eradication program, but feel that these trees are so beneficial to a lot of people. Please consider an alternate solution rather than complete eradication.

Thank you,
Steve Chikazawa

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Steve Chikazawa

Dear Mr. Chikazawa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 29, 2010, on the Draft EA about the trees in your yard. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scenic impact from the scale insect and its effect on strawberry guava products, please see FAQ Nos. 9 and 8, respectively. Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

.....
July 22, 2010
.....

Hawaii Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Dear Dr. Reimer:

As a botanist and conservation professional who has worked in Hawaii for the past 18 ½ years, I am writing in full support of the statewide release of the scale insect, *Tectococcus ovatus*, as a biological control agent for strawberry guava (*Psidium cattleianum*) in the Hawaiian Islands.

One of the reasons I've been able to go into native forests and work on removing invasive plants, despite the overwhelming, and seemingly hopeless task of stopping the spread of terrible weeds like strawberry guava, Miconia, Kahili ginger, and other invaders, is that I always believed help would be on the way one day. I always felt that our efforts to manually, and chemically control such aggressive invaders was buying a little more time for the native forests until a more effective solution was found.

In the case of strawberry guava, it appears that some new help has finally arrived. I realize that the biocontrol scale insect will not solve the strawberry guava problem, and will certainly not eliminate it from the native forests. It is my hope, however, that it will help to tip the balance back just a little bit in favor of the native ecosystems, and hopefully make the other control efforts that much more effective and lasting.

If the biocontrol tool, one of many available to conservation biologists, is taken away as an option, I sincerely believe that all the other efforts that are being expended to preserve our native ecosystems will be wasted in the long run. Thank you for pursuing this critical matter.

Sincerely,



Chuck Chimera
PO Box 1502
Makawao, HI 96768

.....

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Chuck Chimera
P.O. Box 1502
Makawao, HI 96768

Dear Mr. Chimera:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the biocontrol agent, if released, is expected make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I wish to voice my approval of the proposed program for Strawberry Guava Biocontrol. This concurrence on my part is based upon its clearance by APHIS (of which I am a retiree), and also on the success which biocontrol has had with *Lantana camara*, which when I first went hiking in the Wai'anae Mountains, was a terrible pest which could literally 'rip your clothes off,' and also smothered the native vegetation.

As a long-time local botanist (even though I spent 33 years of my life in ka moku 'aina nui and Europe), I view the problems of alien invasive plants as a real problem and threat to the extinction of the native Hawaiian flora. Many endemic species are already extinct, and the removal of these habitats poses a further threat to the endemic biota of birds, land shells, and insect, who are dependent on the native ecosystem. I would wish that the voices against this proposed program were based on true science, instead of kolea emotional misinformation.

--

Aloha,

Al Keali'i Chock

Adjunct Professor & Lecturer of Botany, University of Hawai'i at Manoa

3190 Maile Way, St. John 405D

Honolulu, Hawai'i 96822-2279

Retired Foreign Service Specialist (Regional Director), U.S. Dept. of Agriculture-APHIS

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Al Keali'i Chock
Adjunct Professor & Lecturer of Botany
University of Hawai'i at Manoa
3190 Maile Way, St. John 405D
Honolulu, Hawai'i 96822-2279

Dear Professor Chock:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 12, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Daniel Chung
3324 Wiliama Place
Honolulu, HI 96816
June 30, 2010

Hawaii State Department of Agriculture, Plant Pest Control Branch
1428 South King Street
Honolulu, HI 96814

Dr. Neil Reimer:

I am writing to make comments on the release of biocontrol agents for strawberry guava in Hawaii. As an interested citizen who has hiked on Oahu for 38 years, I would like to urge the State of Hawaii to release these biocontrol agents as well as do further work to develop safe biocontrol on other weeds that are destroying Hawaii's natural heritage and doing us great economic harm.

I was born and raised on Oahu, received a degree at the University of Hawaii and graduate degrees in Biology at Purdue University (Masters) and the University of Michigan (doctorate) before coming back to Hawaii to continue conservation work on the native land snails here. I have worked at the Nature Conservancy (Heritage program) and the Bishop Museum as an associate researcher, have volunteered with the Army DPW Environmental on conservation work with the native land snails, and have written reports for the State of Hawaii DLNR Division of Forestry and Wildlife on the native land snails, most of which are extremely rare and on the verge of extinction. I am writing as a private citizen and not in my capacity as a teacher in the University of Hawaii system or as an affiliate of the Bishop Museum.

I have seen over the nearly 40 years hiking on this island how weeds have been involved in the destruction of habitat for native plants and snails, with strawberry guava being among the worst of the invasive weeds. In terms of land cover, this is the worst invasive weed in Hawaii, covering many square miles of land over all kinds of terrain, much more (to date) than the serious weeds like *Miconia*, *Myrica*, *Schefflera actinophylla*, *Toona ciliata*, *Cinnamomum burmannii*, allspice, *Heliocarpus*, *Ficus microcarpa*, *Citharexylum*, *Clidemia hirta*, Guinea grass and *Cestrum* and a little more than *Schinus terebinthifolius*. With insects now controlling the introduced weed *Leucaena glauca*, strawberry guava can be considered at this time to be the worst uncontrolled weed in Hawaii. Strawberry guava continues to spread upwards towards the summit of the Koolaus and Waianae Mountains, continuing to destroy some of the most important native forests left on this island. I have personally seen numerous areas of native forest on Oahu invaded by and destroyed by strawberry guava in the last 38 years; the spread is slow but insidious. I and many others have also seen a large spread of strawberry guava and other weeds into the forests on the Big Island of Hawaii and elsewhere in the last few decades. What is left after this invasion is nearly a pure monoculture of weeds – primarily strawberry guava, with newly invading *Schefflera*, *Cinnamomum* and *Ficus* also accompanying the strawberry guava (spread independently by pigs and birds). Strawberry guava leaf litter also is

extremely poor habitat for the native terrestrial snail species. Wherever strawberry guava has spread, the native terrestrial snails have declined or died out. Although guava does provide habitat for some of the native arboreal snails, these arboreal native snails appear to prefer native plant species more than alien trees, according to my unpublished studies. Everything I've seen in the last 38 years indicates that nearly all native plants and animals are getting rarer; and my impression is that degradation of our native forests appears to be accelerating on Oahu, much of it by undesirable introduced species and, it appears, changing rainfall patterns as part of global climate change. Studies reported at the recent conservation conference last year by UH professor Tom Giambelluca indicate that strawberry guava causes the loss by evapotranspiration of more than 25% more water than native forest on average. With Oahu suffering from water supply problems, and very severe water problems expected to occur with population growth and increasing drought on this island in the next 50 years, this is a problem that must be addressed as soon as possible.

Strawberry guava cannot be effectively controlled mechanically or chemically without enormous expenditures and secondary damage to other native species, and it cannot be left alone to continue its damage of our biological and water resources. This problem has been left to fester until it is almost beyond all control, except for biocontrol. If the State of Hawaii had a reasonable quarantine procedure for introduced species or a more restrictive import policy for introduced species, we might save ourselves a lot of money, but we are left with a legacy of environmental and economic damage created by species that should not have been brought in, and we have no choice but to use the best methods to bring these invasive species back under control (as they are in their native range) with appropriately tested biocontrol. The tests of these biocontrol agents I saw in the report put online seemed to me to be adequate to show that these species will not attack non-target species. Thus, I conclude that the biocontrol agents should be released into Hawaii. Not to do so is to make matters much worse: causing even more unconscionable destruction of our biological patrimony and water resources. Such a thing would be unforgivable.

In truth, the release of these biocontrol agents is but a good first step in the battle to maintain our ground water supplies and keep the many native species in Hawaii from being driven to extinction by human activities. The other weeds I've mentioned are among a number of other invasives that must also be controlled before they too become like strawberry guava. I've seen *Schefflera actinophylla*, *Cinnamomum burmannii* and *Ficus microcarpa* overtake and destroy mature strawberry guava monocultures and replace them with their own monoculture in the last 20 years; this is a very bad sign of things to come, as they show potential to be even worse weeds than strawberry guava. I urge you to please enact stricter rules on import of alien species. You have done a relatively good job of testing these biocontrol agents for strawberry guava, and I urge that the State use more of its resources to maintain a system by which similar studies can be done on other weeds. It seems to me very strange that biocontrol agents are tested very rigorously, as they should be, but that all manner of other species are brought into Hawaii without the same rigorous testing. All species, and not just biocontrol agents, interact with each other and with the soil, air and water and should be screened to see if they can become serious invasives.

Although there are some pig hunters who have objected to biocontrol of strawberry guava on the grounds that pigs feed on strawberry guava, biocontrol of strawberry guava probably will not reduce pig numbers by itself, as strawberry guava has mostly displaced yellow guava (another

food of pigs and a much more important fruit plant) in the more disturbed areas near roads and trailheads that are the most hunted areas on the island (within about 1.5 miles of trailheads), and pigs are omnivorous and eat a large variety of foods, including tree fern piths that have been displaced by strawberry guava. The damage to forests from strawberry guava, including displacing plants utilized by humans, like koa and tree ferns, displacing more valuable native forest in watershed lands, and displacing many other native plant and animal species is a much greater negative economic and cultural effect than any positive effect I can find for strawberry guava.

I urge you to release these biocontrol agents of strawberry guava without any further delay. I have witnessed delay after delay of this project, primarily for political reasons rather than scientific ones, and this is a shame.

Sincerely,

A handwritten signature in cursive script that reads "Daniel Chung". The signature is written in black ink and is positioned above the printed name.

Daniel Chung

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Daniel Chung
3324 Wiliama Place
Honolulu, HI 96816

Dear Dr. Chung:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 30, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your thoughts on the significance of this effort for the future of Hawai'i's natural environment are appreciated and shared. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control as well as improved quarantine measures have crucial roles to play in conservation of our state's unique native ecosystems.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Comment on June 23, 2010
DRAFT ENVIRONMENTAL ASSESSMENT
Biocontrol of Strawberry Guava
by its Natural Control Agent
for Preservation of Native Forests
in the Hawaiian Islands

by Karen B. Clarkson
July 20, 2010

State of Hawai'i
Department of Agriculture
1428 South King Street
Honolulu, Hawai'i 96814

State of Hawai'i
Department of Land and Natural Resources
1151 Punchbowl Street, Room 131
Honolulu, Hawai'i 96813

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai'i 96721

State of Hawaii
Office of Environmental Quality Control
Kinau Hale
1250 Punchbowl Street
Honolulu, HI 96813

The EA is wholly inadequate in assessing the environmental impact of the proposed release of an alien insect to attack strawberry guava trees. It fails to recognize the significance of the strawberry guava trees to the economic and social welfare of the community by failing to value it as a natural resource, failing to recognize the rights of property owners to compensation for damages, failing to give adequate consideration to alternatives, and failing to demonstrate that it will succeed in achieving the proposed benefits of the project.

The EA does not recognize the value of strawberry guava trees as landscape trees. With their glossy green and red leaves, colorful red fruit, and smooth bark, strawberry guava trees are attractive ornamental fruit-bearing trees that are an important element in the landscape of many properties and neighborhoods throughout the islands. As a real estate broker, I have listed and sold numerous properties where there are beautiful strawberry guava specimen trees, hedges, and hedgerows (see Photos 1,2, and 3) that contribute to the appeal and value of properties. I recently sold a home close to the edge of a very steep stream bank, where the dense strawberry guava hedgerow along the bank protects the owners, their guests and their livestock from danger of falling off the edge, obviates the need for expensive fencing, and protects the home from erosion that would undermine its foundation.

The scale insect will damage these valuable trees by producing ugly galls on the leaves, weakening the trees, and causing leaf loss that in drought conditions might be sufficient to kill the trees. There is no evidence to support assertions made in the EA that property owners, not to mention tourists and the general public, will not notice the disfigurement of the trees and will still find the gall-ridden trees (like gall-ridden ohia trees) attractive (see Photo 5). To the contrary, landscape tree appraisers take into account the condition of trees when determining their value, with the highest value given to trees that are in perfect condition, free of insect damage (see Purdue University Cooperative Extension publication, Landscape Tree Appraisal). There is no evidence for the assertion that dead trees will continue to protect steep banks from erosion. Will they not decompose?

A fundamental flaw in the EA is its assumption that that the effects of the scale insect on strawberry guava trees will be similar to those in Brazil where there are natural predators that keep the insect in check. An EIS is needed to address the following questions about the potential damage the insects will cause to trees in Hawaii: (1) how much more disfigured will the trees be with potentially many more galls than trees in Brazil (2) how much leaf loss will there be in the increasingly frequent drought conditions in Hawaii as a result of global warming (3) how much more susceptible will the trees be rust and fungi that have so devastated the rose apple trees and disfigure ohia as well, and (4) Will dense stands of gall-ridden, weakened strawberry guava trees become a vector for plant diseases that may ultimately affect many other trees? The unsightliness of thousands of acres of blighted rose apple trees around the island should be considered a warning of what might happen (see photo 5). These effects will extend beyond property boundaries to adversely impact scenic vistas which contribute to property values in general and which make our islands attractive to tourists. Reduced property values could amount to millions of dollars, resulting in reduced tax revenues, which will adversely impact the economic welfare of the people of Hawaii.

The EA does not recognize that the proposed experiment represents a taking of property. Instead, it advises property owners that to protect their trees from insect infestation, they should spray their trees or replace them with other "more desirable" trees, which could cost property owners large sums for chemicals, spraying equipment, labor, or for replacing them with other trees. Both the Hawaii and U.S. constitution make it unlawful for government to take property without compensation. . How will property owners be reimbursed for the cost of protecting

their trees and/or the loss of damaged trees and loss of property values? Where will the money come from? In Florida, citrus farmers sued the state and won tens of millions of dollars in damages for the loss of thousands trees that the state department of agriculture required them to destroy in a futile attempt to stop the spread of citrus canker. The state had offered compensation but the courts agreed with the farmers that it was insufficient, and the Florida taxpayers had to pay. The State of Hawaii will be similarly liable for damages to Hawaii property owners for reimbursement for their costs or loss of their strawberry guava trees, but it will be the taxpayers that pay. Therefore, the economic welfare of the people will be adversely affected. The potential damages to property owners should therefore be studied under an EIS.

The EA dismisses the importance of the strawberry guava tree as natural resource that has value for its fruit, wood, and nectar. In public meetings across the Big Island local residents testified that the fruit of the strawberry guava trees is an important element of their diet in these hard economic times and is forage for pigs, which are important in the diet as well, and therefore important to the economic welfare of the people. The EA's response to these concerns is that there will still be fruit. This is a spurious argument as the intent of the biocontrol project as its intention is to reduce fruit production by 60 to 90%. With fruit so few and far between, it will no longer be practical to harvest for food and will no longer be readily available to the needy. While the fruit is not grown commercially, it has value as a subsistence food and as an ingredient in jellies and jams, the production of which is a cottage industry. The flowers have value to honey producers because they are a source of nectar for honeybees. The project precludes the other potential industries that might provide employment and tax revenues. The existing value and potential value of strawberry guava trees as a natural resource merits further study through the EIS process.

Food security is critical to the economic welfare of the people of Hawaii. With only a few days' supply of food available to us at any given time, we are vulnerable to disruptions in shipping and air transportation resulting from natural disasters such as hurricanes and tsunami and from terrorist attacks (9-11) and wars (the first Iraq War). Civil Defense recommends that the people of Hawaii keep an emergency food supply on hand to last several months. How many people have the financial resources for this? Why destroy a natural resource that can supply a free, seasonally abundant and healthful fresh food in emergencies? Might there be ways to preserve it that might make it even more valuable? These matters should be given further consideration.

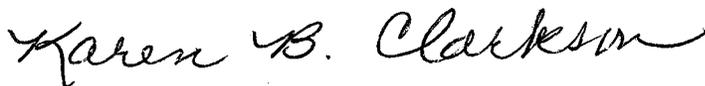
The EA rejects a number of alternatives to biocontrol of strawberry guava trees as not cost-effective. Why base the cost on what it would cost to cut down the entire population of strawberry guava trees? Why not implement localized eradication efforts in selected sensitive areas such as bird nesting sites, and virgin forest areas? In these areas why not cut the strawberry guavas and treat the stumps with Garlon, which is very effective in preventing regrowth? Why not exercise extreme caution and mitigation measures where soil has been disturbed in sensitive areas? For example, in Volcanoes National Park strawberry guavas only seem to grow where man has disturbed the soil, such as where the boardwalk was built in the

area of the steaming vents, and where they could easily be kept under control. Why not focus eradication efforts on other plants which compete with the native forest which have no redeeming value? Why not encourage industries that utilize the fruit and wood crop and provide jobs? More alternatives to biocontrol should be considered and evaluated under an EIS.

Where is there evidence in the EA that attacking strawberry guava trees will significantly reduce the decline of native forests? Does a 60-90% reduction in fruit production correspond to a 60-90% reduction in the number of strawberry guava trees? Will that be sufficient to protect the native forest from invasion? Can the native forest survive the effects of global warming on Hawaii's climate, which include elevated temperatures at higher elevations, reduced rainfall and reduced cloud cover? What other plants are significant threats? These questions should be further addressed in an EIS.

These many deficiencies in the EA make it imperative to conduct an EIS. Unlike the EA, the EIS **"shall not be merely a self-serving recitation of benefits and a rationalization of the proposed action."** (HRS 343, Subchapter 7). The people of Hawaii deserve an unbiased, thorough analysis of all the issues that pertain to an experiment that will have an irreversible effect on our environment.

Sincerely yours,



Karen B. Clarkson
P.O. Box 1396
Honokaa, Hawaii 96727
936-3862

(1) Healthy strawberry guava trees along County roads



(2) Privacy hedge (strawberry guava)



13) Strawberry guava hedgerow along stream bank

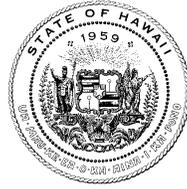


(4) Dying rose apple trees along county road



(5) Gall-ridden ohia tree - "still attractive"?





November 1, 2011

Karen Clarkson
P.O. Box 1396
Honokaa, HI 96727

Dear Ms. Clarkson:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. Regarding your concerns about the impact of the scale insect on fruit, please see FAQ Nos. 8 and 10; for alternative control, see FAQ No. 4; for impacts to households, FAQ No. 8; and for scenic impacts and the value of the plant in landscapes, FAQ No. 9. Our responses to questions or comments you provided that differ from these or raise points not covered in the FAQs or on which we would like to elaborate are covered below. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Scenic value and vitality of strawberry guava a factor in property values

It is first important to note that that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. If someone continued to want strawberry guava as a hedge or fence, this would still be possible with minimal effort on the homeowner's part. Although leaf loss may be severe in drought conditions, it would likely be temporary and equivalent to any other plant with a similar environmental range with its coevolved set of predators. Please understand that the dense hedges you appreciate extend for many miles into the native forest as well. The photo you provide of 'ōhi'a demonstrates that while some leaves have substantial galling, other leaves do not. We simply do not concur with your assessment that trees in their natural state with their natural predators are not attractive. To prefer unblemished plants, in the case of strawberry guava, has consequences including unlimited invasion of native forests, degradation of island watersheds, and serious negative impacts on natural, cultural and economic resources. There is no doubt among scientists who study Hawaiian forests that strawberry guava will cause incalculable damage to native ecosystems if it continues to spread at its current rate.

2. Killing strawberry guava leaves ground susceptible to erosion.

Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil-holding species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion (p. 54). The forests of Hawai'i are important zones of water input that can be adversely affected by

factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology. In fact, strawberry guava has been found to reduce recharge to the island aquifers compared to native forest.

Forests of eucalyptus on Maui, loblolly pine at Koke'e on Kaua'i, miconia on the Big Island, and strawberry guava statewide exhibit similar structural characteristics: a dense uniform canopy with very little understory. In native Hawaiian forests, the impact of raindrops is buffered by leaves of upper canopy trees such as 'ōhi'a and koa, and then again by leaves of subcanopy trees such as mehame, kopiko, hapu'u and kolea and again by epiphytes, ground ferns, mosses, and layers of decomposing branches and leaves. The forests also help block winds and retard evaporation. That is not the case with the dense stand structure and high foliage biomass of strawberry guava, suggesting that for many decades to come these forests will be diverting water that would otherwise recharge aquifers and streams (pp. 55-56).

3. Effect on strawberry guava will not be similar to Brazil; biocontrol may have severe, landscape-wide effects

The EA states that in its native Brazil, where it has its own enemies, the scale insect results in a 25 to 40 percent reduction in vegetative growth rate and 60 to 90 percent reduction in fruit and seed production (p. 35). We do not concur with your conclusion that the EA underestimates expected impacts of the biocontrol in Hawai'i. Reduction in vegetative growth due to *T. ovatus* was measured in Brazil in cages which excluded natural enemies of the scale insect. Impact on fruiting was estimated on trees at a site where natural enemies were not likely to be abundant. Impacts of *T. ovatus* vary considerably from site to site and even tree to tree in Brazil, probably due to a variety of effects (including natural enemies and relative timing of insect dispersal and tree growth). Observations of maximally infested trees are the basis for conclusions on expected impacts of this biocontrol. It has never been observed to kill even small potted plants under extremely high infestation levels. Maximum impacts of the scale insect observed in Brazil are not likely to be exceeded in Hawai'i, and this level of impact is associated with dense galling of leaves affecting most foliage on a plant.

Impacts from the rust fungus on rose apple are extreme and unusual among plant pests. This damage is much more severe than impacts expected or observed in Brazil for strawberry guava with the scale insect. This is because the rust fungus is extremely prolific, effective at dispersal, and severely damaging to young leaves of rose apple. By comparison, *T. ovatus* disperses slowly and randomly, with large numbers of immature insects dying before they can reach a young leaf and establish a new gall. Those that establish galls grow and survive with the leaf - they do not kill it.

4. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects. As we have stated in the EA and in this response, there are no reasons to expect the severe effects you describe.

5. Dying strawberry guava will spread plant diseases to 'ōhi'a and other native plants.

This scenario is particularly unlikely for several reasons. First, strawberry guava is not expected to die from the scale insect. It has never been observed to kill even small potted plants under extremely high infestation levels. Strawberry guava is not significantly impacted by diseases currently in Hawai'i, and apparently not in Brazil either, where it is mostly affected by insects. If a guava rust affecting strawberry guava emerges in Hawai'i, it is most likely to affect principally strawberry guava itself, with its inoculum relatively ephemeral in the environment and not likely to have strong effects on less susceptible species.

6. The government could be held liable for damages to trees on private property, and release would violate private property rights.

Again, while the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an attractive tree. Complete defoliation is very unusual in Brazil and it would not likely happen here either. Considering this, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit fly pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts. Conversely, there might be minor increases in property values through the reduction in fruit fly pests, which gardeners and farmers may value.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. For example, construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

Biocontrol of strawberry guava in Hawai'i is not analogous to cases of citrus tree destruction in Florida, because the effects of biocontrol will not interfere to any substantial degree with the value of privately owned trees. As noted here and in the EA, existing strawberry guava trees will persist and be available for use as desired.

7. Strawberry guava is a resource that has value for its food, fruit and nectar

The EA acknowledges the limited use of strawberry guava and explains that there will continue to be fruit and wood available. Strawberry guava flowers are not considered a particularly important nectar source for honey bees, so a decrease in flowering is not likely to be noticed. There is truly no reason to be concerned about a reduction of up to 90 percent in fruit for a tree that occurs in dense, inaccessible thickets and produces perhaps millions of tons of fruit that are not used by humans but instead are reservoirs for fruit flies and food for pigs. We recognize that people do consume fresh strawberry guava and make homemade jellies with it. They will continue to be able to do so. There will also be absolutely no shortage of wood.

8. Why not just implement localized eradication efforts in virgin forest and bird nesting sites?

The problem lies in the scale of strawberry guava invasion, and the consequences of not protecting large areas of native forest. For example, sustainable native bird populations need large areas with native plant and insect resources at different elevations for different seasons. Strawberry guava is so highly invasive that it takes over all such areas and encourages pig population increase, which increases rooting of the soil and destruction of hapu'u ferns, which pigs destroy for their starch. This in turn brings huge spikes in mosquito populations that lead to avian malaria and bird death. This cycle is largely responsible for the extinction of many remarkable species of Hawaiian birds that evolved over millions of years and are found nowhere else. This continues to occur with remaining bird populations.

In addition to impacts on rare plants and animals and associated ecological and cultural values, allowing extensive invasion of native forests by strawberry guava has major consequences for island water supplies (55-56).

9. Strawberry guavas at HVNP only grow where people have disturbed the ground and can easily be controlled

This is simply untrue. Strawberry guava does not need ground disturbance. We would be happy to walk you through transects infested by strawberry guava that extend miles into relatively pristine forest. As discussed in FAQ No. 4, manual control has only limited effectiveness and is extremely expensive, with its own side effects. Herbicides can be effective for control in limited areas with low density infestations, but if used on a large scale and by many landowners the risk of misapplication (especially exceeding labeled dosage) increases, as does the potential for harm to the environment. At the highest strawberry guava densities, herbicide application to all stems on a given acre can exceed label dosage recommendations. Manual control without the use of herbicide is generally impractical because of strawberry guava's propensity to resprout from cut stumps and discarded stems. Control using existing methods is generally practical only where the plants are readily accessible by roads, a small fraction of the invaded landscape (pp. 29-30). Estimates of the cost of manual removal demonstrate that it is prohibitively expensive across large areas, ranging to over a third of a billion dollars in East Hawai'i Island conservation areas alone.

10. Focus on species that are invasive and have no redeeming value

Conservation professionals in Hawai'i agree that strawberry guava is among the worst invasive plants threatening Hawaiian forests (p. 27). It has been consistently recognized as a high priority for biological control, along with species such as miconia and kahili ginger, which also are targets of ongoing biocontrol research. Unfortunately, Hawai'i has dozens of serious invasive plants which will require investments in careful management, including development of new biocontrol agents, over the coming decades. Prioritizing among these weed targets is indeed an important challenge.

11. Will projected decreases in vigor and fruiting be sufficient to protect native forests from invasion?

As noted in the EA, there is uncertainty over the degree to which *T. ovatus* will be effective at limiting spread of strawberry guava. Based on observations in Brazil, and the history of similar biocontrol projects involving single predators or pathogens, it appears likely that the effort will be at least moderately effective; i.e., enough galling to reduce fruiting and to slow growth to a level that allows strawberry guava to be managed sustainably for the long term. No management action has consequences that are completely predictable. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. The uncertainty associated with biocontrol of strawberry guava appears to be low, due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

12. Can native forests survive global warming?

Hawaiian forests do face potentially severe negative impacts from global warming. However, it would be extremely short-sighted to abandon native ecosystems to invasive species on grounds that invasives might be better adapted to climate change. Native plants in Hawai'i have evolved over the course of many millions of years, during which there have been dramatic shifts in global climate.

Please note that land managers across the state agree that the uncontrolled spread of strawberry guava is among the gravest threats to native forests. It will remain so with or without effects of climate change. Preserving native forests in the face of multiple threats will require serious efforts on many fronts. A detailed discussion of

all threats and management approaches for addressing them is beyond the scope of the current EA.

13. The Department of Agriculture should instead find productive uses for strawberry guava.

There are some existing productive uses for strawberry guava wood that will not be affected in any way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

The EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. It should be noted that even after introduction of the scale insect, stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. Fruiting will be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 19, 2010

Dr. Neil Reimer
HI State Dept. of Agriculture
Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Dear Dr. Reimer:

I have read the Draft Environmental Assessment entitled Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands, and I wish to comment on it. These comments are not intended to represent official NRCS policy on this matter.

I am the NRCS Forest Ecologist for the Pacific Islands, with responsibility for Hawaii, American Samoa, Palau, Guam, the Northern Marianas Islands, the Federated States of Micronesia, and the Marshall Islands. My responsibilities include development of NRCS forestry programs for the islands and extensive fieldwork to classify vegetation types.

My fieldwork with vegetation and soils, primarily on Hawaii and Maui, has given me a first-hand look at the damage to native forests already caused by strawberry guava and insight into its potential for future damage. In relation to my work with NRCS forestry programs for private landowners and nonprofit organizations, strawberry guava is a major management problem for native forest restoration, timber production, and agricultural land uses within its habitat range.

In short, strawberry guava creates wastelands that are very difficult and expensive to restore to productive landscapes.

I found the Draft Environmental Assessment to be thorough, fair, and rational. I agree with the document's anticipated determination of a Finding of No Significant Impact from release of the biocontrol insect.

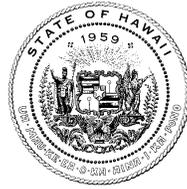
Sincerely,



David Clausnitzer, Ph.D.
Pacific Islands Forest Ecologist
USDA-NRCS
64-1032 Mamalahoa Highway
Kamuela, HI 96743
808-885-6602 ext. 109
david.clausnitzer@hi.usda.gov

cc: Paul Conry, DLNR

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David Clausnitzer, Ph.D.
Pacific Islands Forest Ecologist
USDA-NRCS
64-1032 Mamalohoa Hwy.
Kamuela, HI 96743

Dear Dr. Clausnitzer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your agreement with the anticipated determination of a Finding of No Significant Impact for this project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava and the management problems it creates are echoed in the experiences of many other commenters. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

6-23-10

To Whom It may Concern:

I live on the big Island, in Fern Forest

I have many Guava, + Vio Vee on my property. I like these fruit bearing trees. They are very useful to me. I can make, wine, Jams, Cobbler, or just eat the fruit off the tree. I use the wood for my posts for stairs, for furniture. The uses are boundless.

I'm concerned about your plans for eliminating this useful tree. I'm also concerned about the way you plan on eliminating the trees. I do have resp. issues, + introducing an insect without studying the effects that this insect may cause to our health worries me. remember the rat/mongoose fiasco.

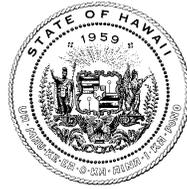
Please, please reconsider.

Shelly Cotsey

P.O. Box 1154

Mt. View - HI 96771

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Shelly Coffey
P.O. Box 11564
Mountain View, HI 96771

Dear Ms. Coffey:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 23, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about loss of fruit and wood, please see FAQ No. 8. Regarding your comment about biocontrol efforts in general, see FAQ No. 5. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

1. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 23, 2010

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Dear Dr. Reimer:

I am writing in support of the biological control of strawberry guava (*Psidium cattleianum*), and the proposed field release of *Tectococcus ovatus* in Hawaii by the United States Department of Agriculture (USDOA).

As a Maui resident of 11 years, I have witnessed what this aggressive weed can do to the native forest, cultural resources, and agricultural industry. Strawberry guava forms dense single-species thickets, displaces endangered species, increases erosion, and inefficiently uses precious water resources. It acts as a host for fruit flies, which can significantly impact crops. Strawberry guava also impacts many native habitats and species which perpetuate Native Hawaiian culture. Most importantly, strawberry guava greatly degrades native forests and destroys their functionality, decreasing the available water for streams and absorption in the forest and ultimately decreasing the amount of clean, fresh water available to businesses and residents. Its potential to consume greater quantities of water than our native species at a time in our history when rainfall trends are decreasing and the demand on our water resources continues to increase is particularly alarming.

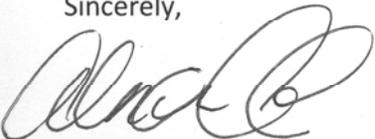
While it is not possible to eradicate strawberry guava, the release of *Tectococcus ovatus* if successful has a chance of bringing the native forest into balance and reducing the hugely detrimental impacts of strawberry guava. The biocontrol agent will give land and resource managers another tool to help with control of it in certain critical watershed and native habitat areas. Strawberry guava will still be available in plenty for those who use the wood or eat the fruit.

Over 15 years, the USDOA and the U.S. Forest Service have conducted the in-depth research and analysis necessary to determine that this proposed host-specific biocontrol for strawberry guava will live only on strawberry guava, and it will not affect other plants or animals in Hawai'i. In test after test where this insect was placed directly on native plants like ohia or on agricultural plants like guava or papaya, it died. The insect only survived on strawberry guava. I feel confident that this research is reliable and a good indication that this biocontrol will help slow the continued spread of strawberry guava into native forests without harming any other plants or animals in Hawaii.

As Art Medeiros of USGS said in a recent Honolulu Star Advertiser article, "the house is on fire, and we're arguing about whether the carpets are going to get wet." For these reasons, I urge the approving agency (Department of Land and Natural Resources, Division of Forestry and Wildlife) to issue a FONSI for the final EA.

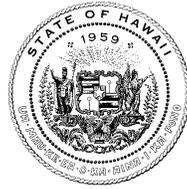
It is my hope that the HDOA continues to support this and other biocontrol initiatives that have been equally well-tested, thought out, and have clear benefits for the residents of our state and our unique natural resources.

Sincerely,



Alison Cohan
accohan@gmail.com
Maui resident

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Alison Cohan

Dear Ms. Cohan:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Department of Land and Natural Resources,
1151 Punch Bowl St. R. 325
Honolulu, HI 96813

July 19, 2010

Patrick Conant
P.O. Box 1172
Volcano, HI 96785

Dear Sirs,

I am writing to you in support of the proposed release of the *Tectococcus* scale insect for biological control of strawberry guava (SG). I only represent myself in these comments. By now, you already know the reasons why we need to control SG in forests. However, protecting our vital watershed protects both forests and agriculture. The preliminary work by Dr. Tom Giambelluca of UH Manoa has provided some very compelling and worrisome data on evapotranspiration of SG vs. that of ohia. This weed appears to be sucking our watersheds dry. Since you may not be as familiar with them, I will review here some of the more direct effects on agriculture.

SG is a huge seasonal reservoir of two species of tephritid fruit flies that are the bane of most tropical fruit crops in Hawaii. Losses to papaya growers alone is estimated to be \$7.8 million a year. Growers must buy pesticide and pay their workers to apply pesticide on crops to control the flies. These pests are one of the big impediments to expansion of tropical fruit cultivation in Hawaii.

Fallen SG fruits not only feed the wild pigs (that destroy our forests and create breeding sites for mosquitoes that transmit avian diseases), they also feed nitidulid (sap) beetles that come to lights in large numbers in areas such as Mountain View, that are heavily infested with SG. The beetle swarms are a major nuisance, and now even a new species is established on the Big Island. The small hive beetle was discovered in June of this year in Panaewa and is already spreading in South Hilo, Puna and other districts where SG is thick. The beetle can breed in tropical fruits in Florida and may well do so in fallen SG fruits. It is a very serious pest of domestic bee hives and may put many beekeepers out of business in East Hawaii if its numbers are "fueled" by SG.

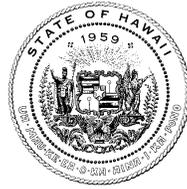
SG is a major pest of windward-side ranchers on all islands. A good friend of mine in Glenwood has spent over \$10,000 cutting and spraying SG to reclaim her rangeland and she says it is still growing back. The Hawaii Cattlemen's Association and the Hawaii Cattlemen's Council have previously shown support for this biocontrol proposal. They know from experience that biocontrol has effectively controlled such rangeland weeds as lantana, hamakua pamakani, Emex spp., and panini cactus in Hawaii.

To be sure you completely understand how small the risk of non-target effects by this insect is, this is the most thoroughly tested insect every proposed for release as a natural enemy of a weed in Hawaii. Gall forming insects have evolved extremely close physiological relationships with their host plants, and these undoubtedly take hundreds of thousands of years to evolve if not much longer. This insect poses no real threat to ohia or common guava or any other plant in Hawaii. In fact, I feel it would be a "dereliction of duty" of both HDOA and DOFAW to not facilitate release of such a safe "tool" to protect our imperiled native wet mid-elevation forest and watersheds. As forest management is a major part of your mandate, you know and I know it is the right thing to do to protect our native forests and watersheds, as well as our tropical fruit crops and windward rangelands. So let's get on with it.

Sincerely,

Patrick Conant

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Patrick Conant
P.O. Box 1172
Volcano, HI 96785

Dear Mr. Conant:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawai'i State Department of Agriculture
Plant Pest(?) Control Branch
1328 S. King St.
Honolulu Hawai'i 96814
Attn. Neil Reimer

Hawai'i State DLNR Div. of Forestry and Wildlife
151 Punchbowl St. Room 325
Honolulu, Hawai'i 96813
Attn. Paul Conry

July 20th 2011
Re: "Biocontrol" of Strawberry Guava

I herewith strongly object to the release of yet another foreign organism, tectococcus, into the environment of our islands under the guise of preserving the Native Forest of Hawai'i.

What has been destroyed of the Native Forest in the Hawai'ian Islands has not been done by the lowly strawberry guava but rather by the various introductions of Island Settlers, i. e. pigs by the Polynesians, and later - with much greater severity and consequences after "European contact" - by goats, sheep, cattle etc. and massive "land clearing" for various agricultural ventures.

Amazingly, all this is revealed in a publication "WAO AKUA", first published in 2003 by our own Division of Forestry and Wildlife, Department of Land and Natural Resources, State of Hawai'i, reprinted in 2004 !!!!

"The Kamehameha butterfly, seen here (pg. 35 of WAO AKUA) on a lehua blossom, is more often associated with its host plant, mamaki (Pipturus spp.) THIS INSECT IS ANOTHER VICTIM OF PARASITIZING WASPS INTRODUCED FOR BIOCONTROL OF ALIEN CROP PESTS."
Another victim! !!!

Does one hand in the DLNR know what the other hand is doing?

The Roseapple is now dead on the Island of Hawai'i and Oahu as far as i know. The Wili-Wili trees are gone island wide. Trees are dying massively from vog and drought in the Pahala/Wood Valley/ Na'aluhu and Waiau areas. HOW MANY MORE TREES CAN THE ISLANDS AFFORD TO LOOSE?

NO MORE INTRODUCTION OF FOREIGN ORGANISMS INTO HAWAII'S ENVIRONMENT!
GMO, ALSO A FOREIGN ORGANISM, HAS DESTROYED THE ENTIRE PAPAYA INDUSTRY IN HAWAII.

On our 3 acres of land we're growing many crops , all organically of course. Some of our wind brakes and privacy hedges are strawberry guava thickets. The fruit of the strawberry guava is a welcome healthy delicious source for jams, jellies, juices and desserts for us and food for the birds that frequent our land whose bio control of insects we need and appreciate.

Thank you for not introducing another foreign species of which no one really knows what havoc it might wreak down the road into the Hawai'ian Islands.

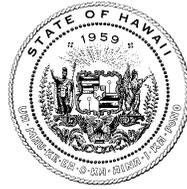
Sincerely,

Hilga Cookello

HC 1 Box 5677

Kea'au, Hawai'i 96749

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Helga Costello
HC1 Box 5677
Keaau, HI 96749

Dear Ms. Costello:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA. Your opposition to the program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the status of our native forest, please see FAQ No. 1. Regarding your concerns about biocontrol in general, see Nos. 3 and 5. Concerning your comment about the impact of the scale insect on fruit, please see FAQ Nos. 8 and 10.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. Concerning your comments about the wiliwili tree, please note that it was a biocontrol program that has saved the tree from extinction by an inadvertently introduced insect with no adverse side effects, demonstrating how effective and targeted modern scientific biocontrol can be. For more information on wiliwili biocontrol: <http://www.oc16.tv/shows/32>.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box 634
Honokaa, Hawaii 96727
(808) 775-0423

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

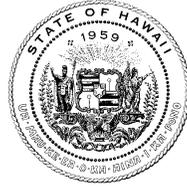
Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.

Alice Cypriano
Alice Cypriano

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Alice Cypriano
P.O. Box 634
Laupahoehoe, HI 96764

Dear Ms. Cypriano:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is fluid and cursive.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box 634
Honokaa, Hawaii 96727
(808) 775-7769

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

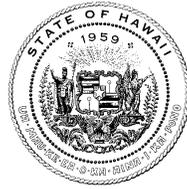
Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.

WADE CYPRIANO


NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Wade Cypriano
P.O. Box 634
Laupahoehoe, HI 96764

Dear Mr. Cypriano:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

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We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

67800

Linda Lingle
Governor of Hawaii
Executive Chambers
Honolulu HI 96873

RECEIVED

Les De Costa PHAO
1002 Uakanikoo St.
Wahiawa, HI 96786
July 18, 2010

'10 AUG -2 A10 :11

DEPT OF LAND
& NATURAL RESOURCES
STATE OF HAWAII

RE: Strawberry Guava

Dear Gov. Lingle,

I am writing to you in regards to something I heard about the Dept. of Agriculture releasing a bug here in the islands to attack our strawberry guava trees. I called the Dept. of Agriculture and spoke with Paul Conrey. I asked him why they want to kill off our strawberry guava and he told me that they don't want to kill off the trees; they want to keep the growth down. So I asked him how sure he was that these bugs aren't going to kill all the strawberry guava trees and then jump to the other fruit trees. He said he was 100% sure it wasn't going to do that. I'm glad he is so confident, as for me and other people we are not so sure no matter how many tests they take, once those bugs are released that is it. We learn from the past and in our past foreigners have brought from their lands many things that have damaged our aina. For example, mongoose was brought here to control the population of rats but they sleep at night when the rats are awake so what's the use of that? Because the mongooses were brought here they now eat our birds. Another example, Tilapia was also brought here as bait and was released in our streams because they can't survive in pure salt water. That is not good for live bait and now the tilapia are eating our local fish, crabs, shrimp, opai, etc. Taape were brought here for bait and they survive very well in salt water in fact, so well that they are eating all of our local fish and Kona Crabs. Blue pincher crabs was brought here to kill our Samoan crabs and are now attacking everything else. Whatever happened to our Chinese bananas my father used to plant, what happened to our rose apple trees? I can go on and on when are we going to learn from our mistakes. Instead of bringing more bugs here they should be thinking of ways to get rid of what was previously brought here that were mistakes of backfired plans. Why not get volunteers to cut down overgrowth areas? How about community service or low-risk inmates? I'm sure they would love to get out and do some work and maybe cut off some of their sentence time. What about our local farmers? They would also love to get some of those trees for their gardens if they could get to it and why not let the people decide if they want another bug here. Have a vote on it instead of a few very smart individuals with no common sense have their way in this matter. Maybe they need to watch more of the Sci fi channel to see what happens to experiments. Frankly everyone I know loves strawberry guavas so if there is too much guavas make guava jelly. My dad was in the great depression during the 1930's and he told me that he had to eat guavas for two weeks because there was no food. Can you imagine if there were no fruit trees? We have already lost too many of our fruit trees we don't want to lose any more. We must again learn from our past mistakes. Please do not let this happen again it is one thing to bring a bug here to attack another bug. But to bring a bug to attack our fruit trees, I do not think so. A friend of mine told me his son went on a seasonal hunting trip on Kauai in the back of a state of Hawaii experimental farm. He said that all the strawberry guava trees were all dead, have they already started releasing bugs there? Mahalo.

Sincerely,



PHAO

CC: Senator Robert Bunda
Rep. Marcus Oshiro
Dept. of Agriculture
Neil Ambercrombie
Muffi Hannaman
City Donovan Dela Cruz
Rep. Micheal Magaoay
Ollie Lunasco PHAO President
Star Advertiser
DLNR

2-0F-3

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Les De Costa
1002 Uakanikoo St.
Wahiawa HI 96786

Dear Mr. De Costa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 18, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about biocontrol and testing of the scale insect, please see FAQ Nos. 3, 5, and 6. Regarding your comment about manual eradication, please see No. 4. You also expressed a concern that the biocontrol has already been released in Hawai'i, but we can assure you that has not occurred.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

None of the examples you provide of introduction of alien organisms, which we agree are problems in Hawai'i, are the result of modern, scientific biocontrol efforts, which have an excellent record.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Denise Dias
Laupahoehoe P.O. Box 225
~~Honolulu~~, Hawaii ~~96825~~ 96764
(808) 962-6576

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

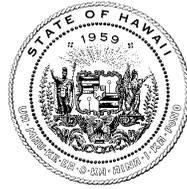
Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.



NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Denise Dias
P.O. Box 225
Laupahoehoe, HI 96764

Dear Ms. Dias:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

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Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box 225
Honokaa, Hawaii 96727
Laupahoehoe (808) 96764

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

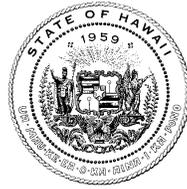
Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.

Gail K. Dias

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Gail Dias
P.O. Box 225
Laupahoehoe, HI 96764

Dear Ms. Dias:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Jul 21, 2010

John and Jane Dodson
1015 Laukupu Way
Honolulu HI, 96825

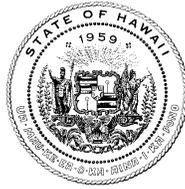
As a private citizen of Hawaii who does not want to see a bio-control of the guava tree, please understand this is not a one size fits all solution. Our seven trees provide shade from the western afternoon sun, add beauty in our yard, and fruit for local friends who come and pick the guavas. The fruit is put to good use by these kapuna. We are alarmed that big government would resort to this solution which will denude our yard that we had professionally landscaped over twenty years ago. This is over-stepping your authority to believe bio control is the only solution. Think again, we taxpayers are not to blame, and, you all need to find another solution.

Mahalo and Aloha

Respectfully,

A handwritten signature in cursive script that reads "John and Jane Dodson". The signature is written in black ink and is positioned below the word "Respectfully,".

P.S. This letter will be used to file claims for damages by the state if our trees die.



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

John and Jane Dodson
1015 Laukupu Way
Honolulu, HI 96825

Dear Mr. and Mrs. Dodson:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about scenic impacts, please see FAQ No. 9. Regarding your concern about the impact on fruiting, see FAQ No. 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Release would violate private property rights.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

2. Endangered species should not take precedence over people.

The proposed action would benefit both endangered species and people in substantial ways, through improvement of watersheds, reduction of the spread of thickets into hunting and recreational areas, and preservation of ecosystem diversity, which has myriad human benefits. It would also benefit Hawai'i's agriculture – improving our self-sufficiency and potentially increasing exports.

3. *The government could be held liable for damages to trees on private property.*

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of private property rights, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Herbert Dorsey
12-423 Ole'ole St.
Pahoa, HI 96778
July7, 2010

Hawaii Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Copy to:
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punch Bowl S, Rm 325
Honolulu, HI 96813

Dear Sirs:

I am opposed to releasing the guava bug on Hawaii Island for the following reasons:

1. Recent genetic discoveries show that while genes don't change the expression of the genes certainly can. This means that the insect can change to adopt to new food sources within a few generations. Guava could possibly become attacked by these insects later on. Can Hawaii withstand the lawsuits for damages from the guava farmers?
2. Dead trees are ugly. We are a tourist economy and tourists don't want to see roads lined with sick and dying trees. Tourists are fascinated by seeing fruit growing wild on roadside trees and often pick it. Removing rather than leaving sickly trees lining the road would be more appropriate.

3. Guava comes in where the ground is disturbed, usually by human intrusion with heavy equipment. Stop clearing in woods and it is less of a problem. Much guava appears in lots prematurely cleared for development .

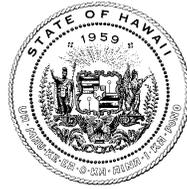
4. I have noticed that when I remove one type of weed it does not mean I will get the desired crop , instead one gets new weeds in place. When guava is removed, Albezia comes in or Melochia umbrelata or Trema orientalis(gunpowder tree). These trees shade out any still existing Ohia. In fact, at lower elevations the Albezia is killing Ohia forests much more effectively that any other tree. The Albezia was introduced by a State Agricultural program. What unforeseen consequences will the introduction of another foreign species of insect have?

Sincerely,

Herbert Dorsey

A handwritten signature in blue ink, appearing to read "Herbert Dorsey", written in a cursive style.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Herbert Dorsey
12-423 Ole'ole St.
Pahoa, HI 96778

Dear Mr. Dorsey:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 7, 2010, on the Draft EA objecting to the release of the biocontrol. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the scale insect attacking other plants, please see FAQ No. 4. Regarding your comment on scenic values, see FAQ No. 9, and see No. 3 for information on biocontrol efforts in general. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Insect can change to feed on common guava.

The evidence from the native range of *Tectococcus ovatus* indicates an extremely specialized host relationship, since this insect is found only on *Psidium cattleianum* (strawberry guava) and its very close relative *Psidium spathulatum* (a plant found only in Brazil). The host range of this insect in Brazil remains extremely narrow in spite of the great diversity of plant species there, including hundreds of species in the same family as strawberry guava. Common guava (*Psidium guajava*) is widespread in this native range of the insect and often can be found near infested strawberry guava. The insect has never been found on common guava in over 15 years of observations in Brazil, and Brazilian literature on pests of common guava shows no mention of the scale insect or any other gall-forming homopterans (p. 37-38). These findings are supported by extensive laboratory testing in Brazil, Hawai'i, and Florida, which found no impact on common guava from the scale insect.

Close host relationships are quite common between insects and plants, especially gall-forming insects, which are typically very highly specialized to feed on a single host plant or very narrow range of closely related plant species. This is because producing galls requires controlling the growth of plants in precise ways at the cellular level. These insects and their host plants represent stable, host-specific relationships that have evolved together over many thousands to millions of years (p. 1). Experience with agents for biocontrol of weeds over the last 100 years indicates that host specificity of agents can be evaluated accurately in advance and use of nontarget species has been almost entirely predictable. Evolution of ability to use host plants in new, unpredictable ways has never been documented in over 1,100 cases of weed biocontrol worldwide over the last century (p. 38-39).

2. Scenic values

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. Because the leaf galls produced by *T. ovatus* in Brazil do not lead to severe defoliation or deformities in the tree, except possibly in cases of an unusual combination of stresses such as prolonged drought which would also affect most other plants, the presence of the scale insect will not be obvious except under close inspection of the trees. Galls formed on strawberry guava leaves are comparable to those that naturally occur on 'ōhi'a, which affect the plant's metabolism but do not disfigure it (pp. 66-67).

See FAQ No. 9 for additional response.

3. Guava and ground disturbance

Although strawberry guava is known to invade land after clearing, preventing further clearing (which would also impact agriculture and home-building in many lots) would not address the problem of extensive invasion by strawberry guava in relatively undisturbed native forests on conservation lands.

4. Strawberry guava will be displaced by other weeds, not natives, with unforeseen consequences.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To:

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu HI 96814

Hawai'i Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu HI 96813

Dear Sir/Madam:

I am writing in strong support of bio-control of strawberry guava in the Hawai'ian islands, as described in "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands, State of Hawai'i, June 2010".

The remnant high-elevation native forests in Hawai'i are a unique environmental and cultural treasure for the world, but they face grave threats in the coming decades from a variety of sources, including non-native plants such as strawberry guava, miconia, and other melastomes. A carefully-studied bio-control agent such as *Tectococcus ovatus* appears to be the best way to save the native forests.

I strongly urge the State to move forward on this plan for biocontrol of strawberry guava.

Sincerely,

Dr. C. Darren Dowell
resident of Pasadena, CA
and frequent visitor to Hawai'i for enjoyment of its native forests

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Dr. C. Darren Dowell
Pasadena, CA

Dear Dr. Dowell:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



University of Hawai'i, Manoa
Pacific Cooperative Studies Unit
3190 Maile Way, St. John 410
Honolulu, Hawai'i 96822

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu HI 96814
hdoa.ppc@hawaii.gov

21 July 2010

Aloha,

I am writing in support of the release of *Tectococcus ovatus* to slow the spread of strawberry guava. Strawberry guava is not native to Hawaii and while I personally enjoy its fruit and the plant in cultivation, it has negative effects on our native ecosystems and native birds that require action if we are to maintain a Hawaiian sense of place and not to become simply like everywhere else.

First, strawberry guava is an aggressive plant and can take over native forest, crowding out native plants, by forming dense single-species clumps. These native plant species and forests exist nowhere else and once they are gone, they are gone, as are the species that depend on them, including plant species used in Hula and other cultural practices.

Second, strawberry guava is spread by pigs which eat its fruits and then wander into native forest, rooting in the earth and eating native tree ferns and creating breeding sites for mosquitoes that spread avian malaria that is killing off our native forest birds. The more strawberry guava in a native forest, the more pigs; the more pigs; the more breeding sites for mosquitoes; the more mosquitoes; the more avian malaria; the more malaria, the fewer apapane, i'iwi and other forest birds. Together this forms a vicious circle that in time could lead to the extinction of many of our native birds.

On the other hand, *Tectococcus* decreases fruit set and growth of strawberry guava so it will be less a resource for pigs in native forest and they won't be attracted to them, helping to break the cycle of death. In other, second-growth forests, pigs have other resources to feed on, so they will be unaffected. Native forest birds are largely absent from these second-growth forests, so they will also be unaffected.

If we want to be California, fine: we do nothing and our forests will become miconia and strawberry guava and our children's children will ask what ohia lehua was. Hula halau will use plastic plants "gathered" at the store, instead of in the forests. We have already lost the po'ouli because of habitat destruction; we will watch the other forest birds fade into the mists and mele. Is that what we want?

Sincerely,

David Cameron Duffy Ph.D.
Professor of Botany and Unit Leader
Pacific Cooperative Studies Unit (PCSU)



University of Hawai'i, Manoa
Pacific Cooperative Studies Unit
3190 Maile Way, St. John 410
Honolulu, Hawai'i 96822

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu HI 96814
hdoa.ppc@hawaii.gov

21 July 2010

Aloha,

This is my second letter concerning the release of *Tectococcus ovatus* to control strawberry guava. I am writing about the economics of manual control of strawberry guava based on on the ground experience.

The Pacific Cooperative Studies Unit, Botany Department , University of Hawaii at Manoa Oahu Army Natural Resources Program (OANRP) is working to stabilize 51 native species of flowering plants, 7 tree snails, and 3 insects on Oahu to prevent their extinction. Strawberry guava is probably the most significant threat to all of these species and the native habitats on which they depend. The majority of the flowering plants and all of the insects are threatened by the ability of strawberry guava to dominate habitats, particularly when feral pigs are present. Tree snails are rarely found on strawberry guava because the leaves are not suitable habitat for the fungi and algae on which they feed. To make matters worse the expansion in range of strawberry guava and the domination of habitats is still ongoing, such that previously unoccupied habitats are now being invaded, further reducing the available space for the native species.

Apart from physically removing strawberry guava from critical areas, our main focus has been to break the synergism between feral pigs and strawberry guava by fencing feral ungulates out of conservation management units. As this phase of our program has progressed we are now at the stage where we need to eradicate strawberry guava from surrounding areas, particularly dense populations, so that we can re-establish native forest throughout the intensively managed conservation units. Our efforts to date has shown that clearing strawberry guava in the absence of feral pigs results in the re-establishment of koa forest and that several native species also return.

Clearing strawberry guava is a labor-intensive effort. We have to transport a wood chipper to the infestation, treat the cut stumps of the plants with herbicide, and chip the plants. Simply clear cutting strawberry and leaving the brush on the ground provides protection for other undesirable alien species, such as rats and slugs. We employ three laborers under a supervisor. The chipper is moved along transects using ropes. The chipper weighs approximately one ton and has to be transported into the area using a Huey helicopter at a cost of \$5,000. For very dense, monotypic stands of strawberry guava, our manpower costs are \$6720/acre and other expenses (fuel, equipment maintenance and repair, safety, herbicides, etc.) are a further \$1500/acre. The cost will be lower in less densely infested areas but not that

much cheaper. To clear a 10-acre area could cost as much as \$90,000, but even a moderately infested area (40-50% cover) would cost at least \$50,000. The cost of managing strawberry guava manually even in small areas is very high, significantly beyond the funding available for the conservation of Hawaii's unique fauna and flora.

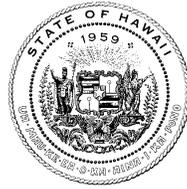
Biological control is the one control mechanism that can bring the strawberry guava infestation under partial control. With time, as the amount of fruit available declines, the synergism between feral pigs and strawberry guava will decline, short-circuiting the expansion and intensification of the infestations. There is no more cost-effective mechanism to control and even reverse the current situation than the proposed release of a biological control agent, in this case *Tectococcus ovatus*.

Sincerely,

A handwritten signature in black ink, appearing to read "David Cameron Duffy". The signature is fluid and cursive, with the first name "David" being the most prominent.

David Cameron Duffy Ph.D.
Professor of Botany and Unit Leader
Pacific Cooperative Studies Unit (PCSU)

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David Cameron Duffy, Ph.D.
Professor of Botany and Unit Leader
Pacific Cooperative Studies Unit
3190 Maile Way, St. John 410
Honolulu, HI 96822

Dear Dr. Duffy:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letters dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. The threats posed by strawberry guava are indeed very real. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

Thank you for your observations on the costs of manually clearing strawberry guava in forest areas. The costs you record – in excess of \$8,000 per acre for dense infestations – are consistent with those of other agencies we consulted. It is clear that managing strawberry guava across hundreds of thousands of acres with manual methods alone is far beyond the resources available.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

07/19/07

Aloha,

For problems of invasive species that are too numerous and widespread for an effective control campaign using pesticides or manual removal, biological control is really the only feasible approach. First, it saves on chemical use. Second, it is self-replicating and self-dispersing, doing most of the work for us. Third, it introduces an element of balance to the system: many of Hawai'i's most monstrous invasive species are uncommon or even endangered in their homelands: *Rauvolfia vomitoria*, weed from hell in Kohala, is endangered in Africa, and waiawi is not crowding out every other plant in Brazil. These plants are probably so successful here in part because their natural biological controls did not come with them. It is reasonable, actually, wise, to bring those controls here when they are tightly co-evolved with the target pest, feeding on nothing else.

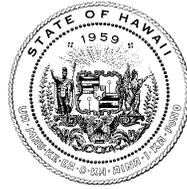
We cherish the 'ohi'a. We do not think that the risk of a switch in host specificity of the waiawi scale insect is significant, whereas the risk to 'ohi'a from the continued spread of waiawi has already proven to be enormous. 'Ohi'a trees in forests such as Wao Kele O Puna are dropping like flies due to the encroachment by waiawi. The 'ohi'a and hundreds of other plant species, as well as the native birds, insects, fungi, spiders, etc, that depend on them, are all in jeopardy. The encroachment is happening so fast it is scary. The other day I had difficulty walking through a forest because it was thickly invaded by waiawi saplings. This same forest was open and inviting and mostly native just 7 years ago, a time when we were already anticipating the release of this biocontrol agent for waiawi.

The unique biology of the scale insect-waiawi symbiosis makes the scale an excellent candidate for a safe biological control agent. The scale attaches itself to the leaf of the host plant, which creates a specific cellular interaction between the two species resulting in the insect being enveloped by the leaf tissue in a gall. This intimate biological interaction, the result of many thousands of years of coevolution, makes a switch in host-specificity not impossible, but extremely unlikely. We feel that the 15 years of careful research, including thorough testing of the scale on over 80 native and cultural plant species, gives us adequate security in releasing this biocontrol agent. Biocontrol has proven to be highly effective and safe in the 35 years since testing and regulation went into effect, and in that time 51+ biocontrol agents have been safely introduced into Hawai'i, many with profound positive effects.

The argument that we should not introduce any more species, including ones that are thoroughly tested for specificity as biocontrol agents, is untenable given that we allow imports of potentially invasive species every day due to inadequate inspections and regulations of incoming cargo. Let us not dismiss this opportunity to slow the destruction of our native forests. Let us reap the benefits of the large effort that has already been made toward assuring us that this biocontrol agent is safe and highly worthy of release.

Mahalo,
Jocelyne Dupuis
RR2 Box 3331
Pahoa, HI 96778
dupuis@hawaii.edu

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jocelyne Dupuis
RR2 Box 3331
Pahoa, HI 96778

Dear Ms. Dupuis:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable. As you note, the practice of biocontrol in Hawai'i has an outstanding history of success and safety in recent decades, but unfortunately much of the public is not aware of this. It is our experience also that when citizens learn more about the science and regulation behind biocontrol, they appreciate that it is needed and can be performed safely.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Date: July 20, 2010

To: Dr. Neil Reimer, State of Hawai'i, Department of Agriculture
1428 South King Street, Honolulu, Hawai'i 96814

and

Ron Terry, Geometrician Associates

PO Box 396, Hilo, HI 96721.

From: Dr. Fern P. Duvall II
PO Box 330940, Kahului, HI 96733-0940

RE: DRAFT ENVIRONMENTAL ASSESSMENT – Bio-control of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

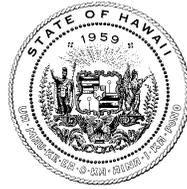
I encourage and support the State Department of Agriculture, both in my roles as a Professional Wildlife Biologist and as a citizen of Hawaii, for a statewide release of the scale insect from Brazil, *Tectococcus ovatus*, to begin important biological control of the insidious invasive spread of strawberry guava (*Psidium cattleianum*) in Hawaii.

Strawberry guava is a threat to the viability of the watersheds of Hawaii, it derails efficient moisture collection and allows for run-off instead of slow percolation of water into Hawaiian aquifers. The costs of manual and chemical control of strawberry guava are well documented in the draft EA and yet even such measures are woefully insufficient and inefficient at the task of reduction and control. Bio-control will help to reduce mechanical and chemical control costs, increase efficiency of control, and should affect plant vigor and slow the rate of seed production and dispersal to new locations.

I understand, and know some of the scientists who have studied this insect for some 15 years to understand its biology and ensure that it will not attack other desirable or native Hawaiian plant species. I support their findings and research, and the previous applicable regulatory reviews.

The proposed action will enhance valued natural and cultural resources in Hawaii. The 'no action' alternative would lead to significant harm to Hawaii. Please proceed with expeditious statewide release of the agent *Tectococcus ovatus*. I should be glad to assist in the releases on Maui Nui if assistance is desired.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Fern Duvall II
P.O. Box 330940
Kahului, HI 96733

Dear Dr. Duvall:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian species, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To Dept of Agriculture, Plant Pest Control Branch, 1428 S. King Street,
Honolulu, HI 96814. Dr. Neil Reimer, and Geometrician Associates PO Box
396, Hilo, HI 96721. Ron Terry,

The incredible ecosystem change brought about by the competitive dominance of Strawberry Guava in Hawaiian native forests is indisputable. I find it disheartening that this fact is not known by every Hawaiian resident and visitor. This biocontrol agent, *Tectococcus ovatus*, when it works as stated in the EIS, there will be a slight reduction in the availability of free strawberry guava fruits for Hawaiian people, but in my opinion, the benefits to native Hawaiian forests far outweighs this inconvenience.

My only reservation is there should be a post-implementation forest monitoring plan to ensure that if the Strawberry Guava stands are reduced drastically, they are guaranteed to be managed to be replaced by some native Hawaiian forest system, since that is a main goal of the *Tectococcus* release. Without this in place prior to the implementation of the agent release, there could be drastic consequences to the forest and to future efforts to protect it with similar means.

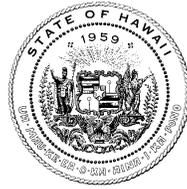
I strongly support the project and have critically reviewed much of the research leading to the release of this biocontrol agent for Strawberry Guava.

The rates and levels of non-intentional introduction of destructive non-native insect, plant, and disease agents in Hawaii is extremely high. The "accidental" introduction of these pests far outweighs the problems of purposefully introduced plants and animals. The numbers of purposefully introduced biocontrol agent has been drastically curtailed by public opinion and regulation during the early 1990s. While I agree that biocontrol has been used in the distant past (pre-1975) as a poorly regulated panacea for some problem pests, the current state of controls regulating against a return to old practices is substantial. The best course of action for saving the remnant forests (many of which are still fairly intact) is to halt the progression of invasive plant species. The use of this host-specific insect to stop the advance of dense Strawberry Guava stands is probably the only course of action to bring about real change, and it will certainly be the most inexpensive option from any point of view. I believe the main problem with this and other purposeful introductions is properly explaining the costs, benefits, research efforts and decisions to the general population. A public perception shift is needed to ensure that the residents of Hawaii understand what "scientists" are doing for all of us in this native environment. I will be waiting to see what the effects of this implementation of *Tectococcus ovatus* biocontrol agent release will be, if approved, on not only the forest system targeted, but on the outcomes of the process. This agent release will have a broad impact on the public opinion of DOA projects, biocontrol research, and funding opportunities for stringent and necessary research projects protecting Hawaii's land, streams, and ocean.

Signed,
Jesse Eiben M.S. in Entomology
1173 Alewa Dr., Oahu, HI, 96817

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jesse Eiben, M.S.
1173 Alewa Dr.
Oahu, HI, 96817

Dear Mr. Eiben:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 6, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your thoughts on the significance of this effort for the future of biocontrol in Hawai'i are appreciated and shared. If this project moves forward, the USDA Forest Service is committed to post-release research that will quantify the efficacy and impacts of biocontrol in invaded forest plots, develop methods for integrating biocontrol with other approaches to restore guava-degraded forest with native plants, and demonstrate the specificity and usefulness of this biocontrol agent to our interested and concerned public.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawai'i Department of Agriculture Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814 hdoa.ppc@hawaii.gov

Hawai'i State DLNR, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, Hawai'i 96813

From: Page Else, RR4 Box 2225, Paho, HI 96778

July 23, 2010

Dear Reviewers:

These comments are my personal comments in support of the release of the strawberry guava biocontrol natural enemy. These comments have been formed by my professional experience in the field of conservation and conservation outreach.

I gave an oral presentation at the Hawaii Conservation Conference in 2009 describing the history and successes of biocontrol in Hawaii. This presentation was the outcome of review of published literature and interviews with biocontrol experts.

I have given similar presentations in several oral presentations on Hawaii Island, and have displayed biocontrol information at numerous festivals and events. When talking to the public about biocontrol, I have heard many times fears that the insect will mutate and attack new hosts, or spread uncontrollably. I believe that this fear has been fostered by misinformation and also by a lack of understanding of insect biology and genetics. Most people do not know why an entomologist would feel one insect species is a good candidate for biocontrol and another not. I believe there would be less public opposition to biocontrol if there were a better understanding of the scientific principles and observations that lead to selection of natural enemies. The risk as perceived by some members of the public is far greater than the risk calculated on the basis of scientific testing and data collection.

In a review of the evidence for rapid evolution of biological control agents, Van Klinken and Edwards (2002) state that: "Most cited examples of so-called host shifts from weed biological control were not the result of genetic change.....Changes in fundamental host-range should not be a concern for biological control practitioners. The risk that changes in quantitative host use traits will result in the addition of a previously unusable host are minimal. The risk of host additions or replacements that require specific individual or multiple mutations are even less likely, and are no more likely to occur for an introduced species in the future than in the past or future for a native species....available evidence from weed biological control suggests that rapid, directional evolution of host-specificity is not a widespread phenomenon among narrowly host-specific herbivores. The risk of rapid evolution of biological control agents resulting in unacceptable non-target impact therefore appears small."

Very few people are aware of the long history of biocontrol releases in Hawaii, the extent to which it has been practiced, and the number of successes. Therefore they do not think of biocontrol as a valuable tool. I believe that many people are only aware of negative examples of biocontrol (generally early non-regulated private releases) and that inclines the public to opposition. Some releases have had non-target impacts, but those impacts were predictable. Lessons were learned and the current regulatory process is quite stringent. Since 1975, when a stricter review process was initiated' none of the over 50 biocontrol releases have been known to attack non-target species (Reimar, 2000, none documented in literature since 2000). I believe the current regulatory control process and required testing adequately minimize the risk in biocontrol releases.

I have also gained the impression that many individuals who oppose the release of the natural enemy have not observed the impacts of strawberry guava in native forests and do not understand the threats to watershed health and water quality. They do not understand the uniqueness of Hawaii's endemic species or the value of their biodiversity. I believe these values are so great that they must be protected and that the biocontrol release is an important and necessary tool for protection. I believe the proposed biocontrol release is justifiable given the dangers posed by strawberry guava spread to native forest and watershed function. The release will benefit the environment and will not pose a significant risk to private property.

While property rights advocates complain that the government should not release something that may affect their private property, they do not question their own actions in fostering species on private property that have deleterious affects on public lands and vital processes like groundwater recharge. Such actions harm my own, and other citizens, interest in public lands and ecosystem functions.

I believe there would be more unified public support of biocontrol if there were a better understanding of the successes and extent of biocontrol expertise that has been developed in Hawaii over the past 100 years. Biocontrol has a good cost benefit ratio, and decreases the need for chemical use and manual disturbance. It provides long-term self-perpetuating control of pests. In the current economic climate, it is vital to have biocontrol available as a management tool.

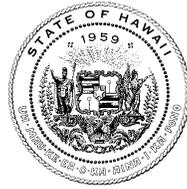
References:

Van Klinken, Rieks Dekker and Owain Rhys Edwards. 2002. Is host-specificity of weed biological control agents likely to evolve rapidly following establishment? Ecology Letters, (2002) 5: 590-596

Reimer, Neil J. 2000. REVIEW AND PERMIT PROCESS FOR BIOLOGICAL CONTROL RELEASES IN HAWAII. pp 86-90 IN PROCEEDINGS OF WORKSHOP ON BIOLOGIC Control of Native ECOSYSTEMS IN HAWAII. 2000. PCSU Tech Report 129.

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Page Else
RR4 Box 2225
Pahoa, HI 96778

Dear Ms. Else:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. As you note, the practice of biocontrol in Hawai'i has an outstanding history of success and safety in recent decades, but unfortunately much of the public is not aware of this. It is our experience also that when citizens learn more about the science and regulation behind biocontrol, they appreciate that it is needed and can be performed safely.

The threats posed by strawberry guava are indeed very real. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu HI 96814

hdoa.ppc@hawaii.gov

RE: 2010 06-23 ST-DEA-Biocontrol Strawberry Guava

July 22, 2010

Aloha,

We cannot act fast enough to slow the spread of strawberry guava. Here at County of Hawai'i, our council has heard lots of experts report on this pest, and I am convinced bio-control action is badly needed to aid in the fight to preserve our scarce native ecosystems.

Thank you for this fine Draft Environmental Assessment. Please continue to move forward with this work as quickly as possible: the strawberry guava is a terrible nuisance.

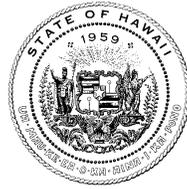
Sincerely,

Guy Enriquez

cc: Hawai'i Department of Land and Natural Resources

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Guy Enriques

Dear Mr. Enriques:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

20 July 2010

Chris Farmer
PO Box 1167
Volcano, HI 96785
loxioides@yahoo.com

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: STRONGLY Support the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

Dear Dr. Reimer and the Hawai'i Department of Agriculture:

I strongly support the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to Hawai'i's precious and unique biodiversity, and if it nothing is done we will continue to lose our endemic flora and fauna. Releasing a biocontrol agent for strawberry guava is necessary to protect Hawai'i.

Hawai'i's forests should be dominated by native species such as 'ōhi'a or koa, but strawberry guava is outcompeting these species and dominating the lowlands of the state. Strawberry guava forms dense, impenetrable thickets in the lowlands on each island. It grows so dense that it prevents any understory from forming, greatly increasing the rate of erosion thereby damaging the water quality throughout the state. This also has long-term ramifications in habitat restoration, as it will be very difficult to replace all that soil that has accumulated over thousands to millions of years. We must act now to prevent further damage to the ecosystems of the state.

Biological control agents are a tested and effective tool to reduce the damage caused by invasive species in Hawai'i. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawai'i's native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai'i too long, and land managers cannot keep up with it. *T. ovatus* will not eradicate strawberry guava, or even completely halt its expansion. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry

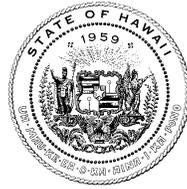
guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give 'ōhi'a and koa seeds a chance to sprout, survive, and grow into mature trees.

Hawai'i's forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava's natural control is the prudent and responsible action to take to protect our forests for future generations to enjoy. Please think of all the species we have already lost, and act now to prevent additional losses. Thank you for your consideration, and please act to protect Hawai'i's biodiversity.

Sincerely,

Chris Farmer

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Chris Farmer
P.O. Box 1167
Volcano, HI 96785

Dear Mr. Farmer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Comment on EA re release of Tectococcus ovatus

RECEIVED

The EA as written is not an impartial assessment of the impact of the release of *T. ovatus* to control strawberry guava, *Psidium cattleianum*. It is so slanted in favor of the release that it borders on propaganda. A phrase such as "level the playing field" does not denote any scientifically relevant process in an ecosystem.

JUL 22 11:27
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

The map of "potential" spread of strawberry guava featured prominently as an argument for the release is misleading. The colors used are designed to cause alarm. Little evidence is presented for the conditions under which strawberry guava will spread as predicted.

The most serious problem with the EA's finding of "no impact" is its lack of a systems analysis of the presence in the ecosystem of thousands of acres of diseased strawberry guava or the absence of the strawberry guava and its fruit.

One possible scenario from a systems perspective:

Puccinia rust infects rose apple -> strawberry guava under rose apple contracts puccinia rust -> (Nearby healthy strawberry guava. resists infection)
-> gall-infested strawberry guava more susceptible to puccinia rust

Puccinia rust infects ohia

Gall infested strawberry guava becomes significant vector for spread of puccinia rust to dominant species (ohia) in much of remaining native forest

This possible scenario, with all elements currently present on Big Island, would result in an outcome which is the reverse of the intended outcome.

The authors are so determined to release tectococcus ovatus, they do not want to admit that there will be unintended consequences with the release. Any biocontrol experiment of this magnitude will have unexpected outcomes. The certainty that no negative impacts will occur is dangerous. This is particularly grave when there is a lack of a systems analysis of possible outcomes.

I have told the authors at public meetings and in written testimony that an EIS is needed to think through what will happen to the elements of the forest system on Big Island as this massive change unfolds.

I live in a forest with native and non-native species. I spend most days working in the forest. I have asthma. The claim that "there will be no health impacts" is not supported by any scientific study of the effect on persons with asthma of inhaling tectococcus ovatus. In my quiet enjoyment of an active life reforestation, I do not want to be subjected to a potential allergen without my consent. I do not give my consent as a citizen to the release of t. o.

One possibility in reforestation in the presence of strawberry guava is to replace strawberry guava that has been removed with appropriate native plants. This strategy has been most successful in the mixed mesic forest in which I live. Where I have only removed strawberry guava, native plants do not spontaneously sprout. A combination of cutting strawberry guava, removal by weed wrench, introduction of sword ferns and native species suited to the habitat.

One of the comments in the EA, that “nothing grows under strawberry guava” is not accurate in my experience. While clearing a particularly thick stand of strawberry guava, we discovered a young ohia tree. When that tree was left on its own, without the protection of other trees, even strawberry guava, the brisk trades broke its top. In other situations where I cleared strawberry guava too fast and completely, the remaining native trees suffered from too rapid alteration of wind and light regime and died.

Reforestation is complex where strawberry guava has become an integral part of the ecosystem. The claim that *tectococcus ovatus* will level the playing field and lead to the comeback of native forest requires a huge leap of faith. The specific mechanisms by which the native forest will restore itself have not been identified in the EA. An EIS is needed to detail these processes.

The parties concerned may discover that by releasing *t. ovatus* on such a massive scale in sensitive ecosystems that as many problems are generated as solved. An infestation of even worse invasives may be the result in some areas.

Please come visit my mini-system native reforestation. I have learned to use the strawberry guava as windbreak and over story, protecting the remaining native species. When I remove a non-native plant, I replace it with plants chosen to succeed. The process requires patience, observation and a deep commitment to the newly emerging forest system. The emerging native forest is given a true advantage.

The stark dichotomy between Action and No Action is part of the propaganda used in this EA. If the million dollars used in studying the feasibility of the release of *t. ovatus* had been spent on a remove, replace strategy along the edges of existing native forest and encroaching non-native species, considerable progress would now have been made toward restoring tracts of native forest. A bonus would be that significant numbers of people could have been trained and employed in this endeavor. Many people have worked with me over the years in this pilot project. Most of them would have been happy to continue doing the work. Unfortunately, I do not have a budget to train and hire people to reforest. In the current economic climate, this kind of work could employ a number of people. A more sustainable model could be used and the public funds spent could have gone into a project that would accomplish the stated goal and benefit the entire island economy.

One other side note. I took a workshop on fruit flies and was given attractant and made traps for the fruit flies that are destructive to agriculture. I anticipated catching large

numbers of med flies and others. However, my traps remained empty. I did some preliminary checking and hypothesized, with some more expert help, that the fruit flies in the forest on the strawberry guava fruit were the more harmless drosophila.

Perhaps the vector is going in the other direction in those areas where the destructive fruit flies are found in adjacent strawberry guava thickets. Of course a loop develops and the destructive fruit flies remain in the strawberry guava. They do not seem to accompany the strawberry guava into all ecosystems.

Constance Fay

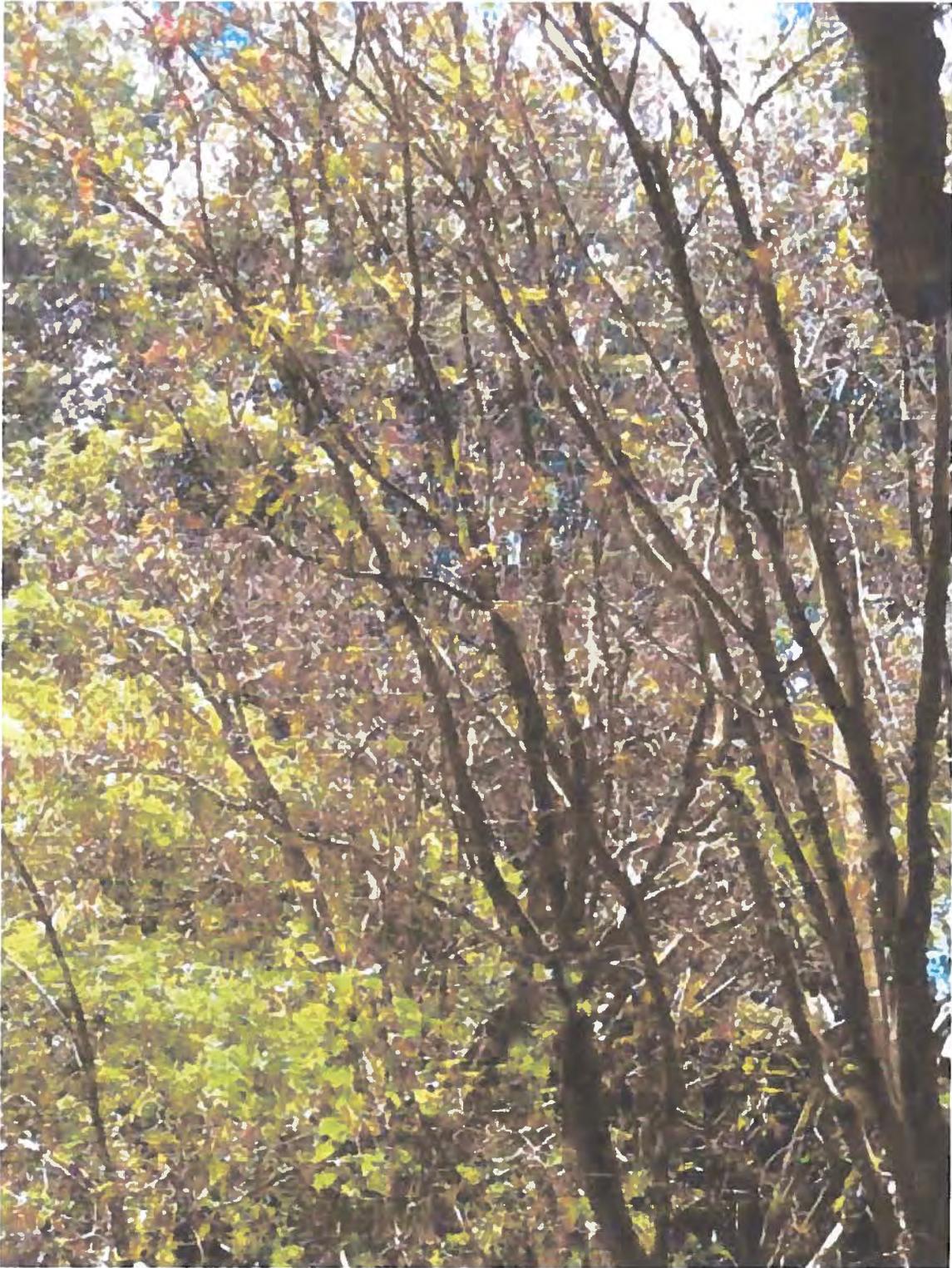
Director, Reforestation project on 6.3 acres mesic forest on Hamakua coast. USFWS Partners Project.

For eight years I have been removing non-native plant species and replacing them with native species, including two rare plant species.

Education. University of Chicago, Committee on Human Development, 1969-1972
Doctoral Program.

Horticulturalist.

Photos from mesic forest, Hamakua coast.



ROSE APPLE DYING FROM PUCCINIA INFECTION



OHIA SHOOT SHRIVELED FROM PUCCINIA INFECTION



STRAWBERRY GUAVA INFECTED BY PUCCINIA RUST
(GROWING UNDER INFECTED ROSE APPLE)



HEALTHY STRAWBERRY GUAVA (NO PUCCINIA RUST)



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Constance Fay, Director
Hamakua Reforestation Project
Honokaa, HI

Dear Ms. Fay:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA. It is first important to note that that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. Our response to your specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Impartial scientific basis of the information presented in the EA.

We respectfully disagree with your criticism regarding the objectivity of the EA and the validity of the arguments and data presented. It is true that conservation biologists in Hawai'i have a common value system that emphasizes the importance of maintaining the integrity of the native ecosystem for its biological, cultural, aesthetic, and watershed values. This is also accepted State and national policy. Maximizing these values is a goal for most biologists in Hawai'i, just as treating and preventing disease in humans is a goal for doctors. This value system does not prevent objectivity, as sound medical research shows.

2. Spread of strawberry guava

The spread of strawberry guava has been well-documented in dozens of studies, some of which are cited in the Draft EA, and in the experiences of many land managers on the ground with decades of experience, as discussed extensively in Section 1.3. The colors on the map were appropriate for illustrating the problem.

3. Dying strawberry guava will spread plant diseases to 'ōhi'a and other native plants.

This scenario is particularly unlikely for several reasons. First, strawberry guava is not expected to die from the scale insect. It has never been observed to kill even small potted plants under extremely high infestation levels. Strawberry guava is not significantly impacted by diseases currently in Hawai'i, and apparently not in Brazil either, where it is mostly affected by insects. If a guava rust affecting strawberry guava emerges in Hawai'i, it is

most likely to affect principally strawberry guava itself, with its inoculum relatively ephemeral in the environment and not likely to have strong effects on less susceptible species. The damage you have noticed on strawberry guava is probably not due to *Puccinia* rust spreading from rose apple. Please contact us if you would like assistance determining the cause for the damage you observe.

4. The scale insect and allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

5. EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

6. Assistance provided to native species by strawberry guava groves

Our experiences in preserving and restoring sensitive ecosystems and those of dozens of land managers quoted in the Draft EA indicates that native species fare far better with a reduced presence of strawberry guava.

7. The biocontrol effort won't effectively reduce the fruit fly problem.

As briefly noted in the EA, a collaborative effort between USDA-ARS and the University of Hawai'i has over the last decade undertaken managing pest fruit flies over large areas of agricultural production in the state. The tools for this program are products of many years of research on fruit fly biology, as well good practices such as careful removal of ripe fruit from crop fields and selective, targeted use of insecticides. You may be interested to learn more about the program (www.fruitfly.hawaii.edu). This approach integrating a variety of control tactics to suppress pest populations over large areas has proved successful for a number of major pests across the U.S., including now fruit flies in Hawai'i. However, as the EA states, these attempts to manage fruit fly pests in Hawai'i are severely constrained by the abundance of fruiting strawberry guava. Researchers who have worked extensively with farmers say that with almost every crop studied, the number-one problem interfering with broader management of fruit flies was the impact of strawberry guava (p. 13). They estimate that 95 percent of fruit fly populations can originate from wild common or strawberry guava stands. In windward wet climates, strawberry guava is the predominant host, providing breeding grounds for high populations of fruit flies that can attack orchard fruits up to five miles away (p. 51). Biocontrol of strawberry guava by itself will not eliminate problems with fruit fly pests, but it will be highly beneficial for Hawaiian agriculture if strawberry guava fruit can be reduced as a source of fruit flies. Then other fruit fly management strategies will have a chance to be much more effective.

The potential for strawberry guava to sustain fruit flies and ruin other agricultural crops is well known in other locations. For example, in Florida, the protocol for certifying fresh citrus fruit to be fruit-fly free involves having the crops located at least 1.5 miles from strawberry guava, whether wild or within the landscape of a residence (p. 13).

8. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

9. The Department of Agriculture should instead find productive uses for strawberry guava.

There are some existing productive uses for strawberry guava wood that will not be affected in any way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

The EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. It should be noted that even after introduction of the scale insect, stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. Fruiting will be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

10. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.

Plant Pest Control Branch Chief

Hawai'i Department of Agriculture

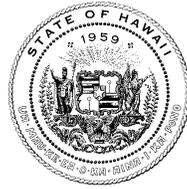
I fully support the use of a bio control in the control efforts of Strawberry Guava on all Hawaii Islands. This effective tool will help slow the spread and slow the decline of native forests. I also support full eradication, of this non-native species.

Thank you
Joseph Fell-McDonald
160-Keonekai Road 16-201
Kihei , Hawaii. 96753

808-298-6868

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Joseph Fell-McDonald
160-Keonekai Road 16-201
Kihei, HI 96753

Dear Mr. Fell-McDonald:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 16, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

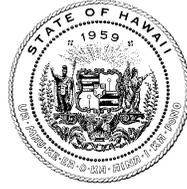
Has anyone taken this insect and starved it for a brief period, and then introduced a regular guava tree? All things adapt and have strong survival instincts. If this insect does its job efficiently could it not make the move to regular Guava should the Strawberry Guava decline significantly?

Ezra

Figueroa

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ezra Figueroa

Dear Mr. Figueroa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 9, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your concern that the insect might adapt to another host plant, please see FAQ No. 5. Further response to your specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Will Tectococcus ovatus attack common guava as well?

Extensive laboratory testing (including no-choice starvation tests) in Brazil, Hawai'i and Florida found no impact on common guava from the scale insect. The evidence also includes more than 15 years of observations of the insect populations developing on strawberry guava in close proximity to common guava trees at field sites in Brazil. A review of Brazilian literature on pests of common guava showed no mention of the scale insect or any other gall-forming homopterans (scale insects, aphids and relatives) (pp. 37-38).

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

TO hdoa.ppc@hawaii.gov
FR davidfinkelstein@juno.com

RE: Project Name: Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

My name is David Finkelstein and I would like to express my support for this proposed biocontrol project. My wife and I own a three-acre parcel in the Kapoho area in the lower Puna district. When I purchased this property fourteen years ago, the strawberry guava was only one of many invading species killing the native species (incl. Ohia) in our area. Now, a decade and a half later, strawberry guava has become our number one invasive species challenge. The thickets expand every year, encompassing and eventually killing, more and more native species. And we've never had any success with reasonable herbicide use, as the strawberry guava just resprouts along the edges. The only economically possible choice left is digging the strawberry guava out with a backhoe, which also kills most native plants in the area.

The argument against this important biocontrol introduction is that we shouldn't introduce ANY species to Hawaii. This head-in-the-sand attitude denies the successful role of biological efforts in other parts of the country and world. Responsible use of biology is an important part of what it will take to save our native species in Hawaii.

Thank you for considering my views.

David Finkelstein
July 12, 2010
RR 2 Box 3313
Pahoa HI 96778
Davidfinkelstein@juno.com
936-7674

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David Finkelstein
RR 2 Box 3313
Pahoa HI 96778

Dear Mr. Finkelstein:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 12, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the kind of hard work you have done removing strawberry guava, the proposed biocontrol agent would provide another critical tool for managing this invasive plant and make your efforts more sustainable. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is fluid and cursive, with a long horizontal stroke at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Joshua Fisher
1995 Wilhelmina Rise
Honolulu, HI 96816
joshuapfi@gmail.com

July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is necessary to protect Hawai'i's native forests.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

O'ahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that 'ōhia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ōhi'a and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers,

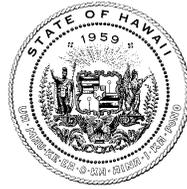
opening up pastures on the Big Island and making them usable again. When Hawai'i's native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai'i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give 'ōhi'a and koa seeds a chance to sprout.

Like Hawai'i's language and culture, Hawai'i's forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava's natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,
Joshua Fisher

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Joshua Fisher
1995 Wilhelmina Rise
Honolulu, HI 96816

Dear Mr. Fisher:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is fluid and cursive, with a long horizontal stroke at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha Kakou,

I am a fifty year Part-Hawaiian man who has enjoyed the fruits of the Strawberry Guava since I was a child. I also have studied Hawaii's unique forest environment and have completed University level studies with a Bachelor of Science in Tropical Horticulture. This background enables me to use sound judgement when I submit my vote FOR eradication of Strawberry Guava with the means of Biocontrol.

I support efforts to control the invasive strawberry guava by its native control insect. The extreme crowding out of native plant species by the Strawberry Guava must be controlled in order to protect our critical habitat.

Native Forests engulfed in Strawberry guava experience 27-50% reduction of water from our soils, streams, and groundwater systems.

Strawberry Guava threatens Hawaiian archaeological sites and the plants and animals which the Hawaiian

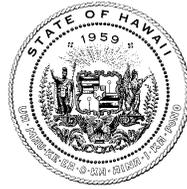
culture is tied to. Strawberry guava threatens Farming/Agriculture by supporting fruit flies which damage produce and export potential.

If nothing is done, we will lose much of our native forest due to overcrowding by the Strawberry Guava. Please vote FOR use of biocontrol against Strawberry Guava. This is the biggest problem I see, when I walk into the Hawaiian forest. Strawberry Guava dominating all native plant species .

Mahalo,
Mark Lindsey Franklin

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mark Lindsey Franklin

Dear Mr. Franklin:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawai'i Chapter Society of American Foresters
J. B. Friday, Secretary
1416 Kilikina St
Hilo, HI 96720

Hawai'i Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

hdoa.ppc@hawaii.gov

July 20, 2010

Dear Department of Agriculture,

The Hawai'i Chapter of the Society of American Foresters supports the introduction of the biocontrol agent proposed for strawberry guava. Strawberry guava poses a great threat to our native Hawaiian forests. Biocontrol is the only feasible method of controlling this invasive plant over the extensive areas that it has already spread.

The Society of American Foresters is the professional society representing the forestry profession nationally. Members qualify by having college-level education and working experience in the care and management of forests. Our Hawai'i chapter includes 29 foresters employed in both the public and private sectors. We have spent our professional careers working as stewards of Hawaii's natural environment and particularly Hawaii's forests.

Unless strawberry guava is controlled, most of our lowland native forests will eventually be replaced by guava. Strawberry guava thickets today may extend to 3,500 feet elevation, and individual plants can be found at over 4,000 feet. This includes many areas of remaining native Hawaiian forests. These forests provide important cultural, economic, and environmental products and services. Strawberry guava is an imminent and growing threat to the sustainability of these native forests and the products and services they provide.

The most important economic "product" from Hawaii's forests is water. The focus of professional forestry in Hawai'i for over 100 years has always been about protecting and restoring forested watersheds. Strawberry guava thickets have been shown to use more water than adjacent native forests, leading to less recharge of our island aquifers. Sedimentation would likely increase in land invaded by strawberry guava, as most groundcovers cannot survive in the dense shade of guava thickets.

Our current forest industry is largely based on wood harvested from our native koa trees. While koa trees regenerate naturally after harvests or natural disturbances, they are unable to outcompete strawberry guava. Once koa trees are harvested in forests filled with strawberry

guava, the guava takes over and prevents any koa regeneration, impacting native restoration and eliminating opportunities for a sustainable forest products industry.

The modern science and management of biocontrol have been successful in Hawaii. The most noticeable case is biocontrol of banana poka. While the vine is still common today, it does not form the dense layers in the koa forest canopy that it did before the biocontrol agent was introduced in the 1990s. The goal of biocontrol is not to eliminate a species but rather to control it and bring it back into balance with nature through natural pests, predators, and diseases. The reason many non-native plants are invasive here in Hawai'i is that they are able to grow rapidly without these natural controls. Once such controls are restored, the plants can coexist within a diverse community rather than functioning as a invasive weeds.

In closing, we urge you to approve release of the biocontrol agent for strawberry guava, a necessary decision to protect the future of Hawaii's forests.

Sincerely,

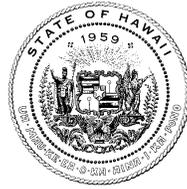
A handwritten signature in black ink that reads "J B Friday". The signature is written in a cursive, flowing style.

J. B. Friday, PhD

Secretary, Hawaii Chapter Society of American Foresters

Cc: Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325,
Honolulu, Hawaii 96813

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

J.B. Friday, Secretary
Hawai'i Chapter Society of American Foresters
1416 Kilikina St.
Hilo, HI 96720

Dear Dr. Friday:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating the Hawai'i Chapter of the Society of American Foresters' support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To whom it may concern:

I am wholeheartedly in favor of releasing the *Tectococcus ovatus* to control the invasive strawberry guava. We need to protect our native forests and the native and/or endemic plants and animals that depend on the native forests as well as the all-important watershed. It is very alarming to see the amount of invasive species of plants and insects that are introduced to Hawaii every year. The State's elimination of many of the ag. inspectors due to our dire financial situation is equally disturbing, but it seems like the long-term affects of not being more active in stopping these invasions has not been given serious consideration.

Sincerely,

Glen Fujinaga
POB 5014
Hilo, HI 96720

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Glen Fujinaga
P.O. Box 5014
Hilo, HI 96720

Dear Mr. Fujinaga:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control as well as improved quarantine measures have crucial roles to play in conservation of our state's unique native ecosystems. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



HAWAI'I FOREST INDUSTRY ASSOCIATION

P. O. Box 66 ❖ 'O'ōkala, HI 96774

Phone: 808-933-9411

Email: hfia@hawaiiforest.org

Website: www.hawaiiforest.org

July 22, 2010

Hawaii Department of Agriculture Plant Pest Control Branch

RE: Testimony in Favor of the Release of the Brazilian Scale for Strawberry Guava

On behalf of the Hawai'i Forest Industry Association (HFIA) Board of Directors I would like to express our support for the release of the Brazilian scale to control strawberry guava. HFIA is a 20 year old organization that advocates for healthy forests and healthy communities. Clearly the issues of controlling the spread of this fruit tree, which has proven beneficial to our communities, is difficult and has been divisive.

After reviewing the facts, balancing the possible costs and benefits, the HFIA is in favor of proceeding with the use of biological control measures to reduce the spread virulence of the spread of strawberry guava. Strawberry guava impacts native forests by crowding out and taking over habitat for native plants and animals; threatens cultural resources such as ancient Hawaiian archaeological sites; threatens local agriculture by increasing damage by fruit flies; and reduces water availability from soils, streams, and groundwater systems.

According to reports, the Brazilian scale is a safe option for sustainable, long-term management of strawberry guava based on the insect's biology and the results of over 10 years of host-specificity. Fifteen years of testing has shown that the insect will only survive on strawberry guava. Studies have indicated that the release of the scale would help to lessen the fruiting, and slow down the spread of the guava, lessen the fruit fly load, and slow down the spread of strawberry guava into the native forest areas.

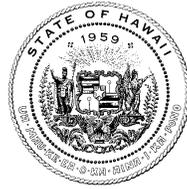
Current chemical and mechanical control options are limited and unable to address the magnitude of the problem and rate of spread of strawberry guava. HFIA strongly supports the release of the scale.

Sincerely,

A handwritten signature in cursive script that reads "Heather Gallo".

Heather Gallo, Executive Director
Hawai'i Forest Industry Association

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Heather Gallo
Executive Director
Hawai'i Forest Industry Association
P.O. Box 66
O'okala, HI 96774

Dear Ms. Gallo:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your Board of Directors' support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable. As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

From: Lydia Garvey
Subject: Control invasive strawberry guava by scale insects, not toxic chemicals!
To: hdoa.pcc@hawaii.gov
Date: Wednesday, July 21, 2010, 5:27 PM

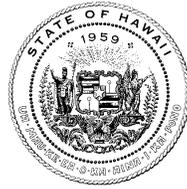
It destroys native forests, native species, water, cultural resources & local Ag. Your attention to this most urgent matter would be much appreciated by all present & future generations of all species.

Thank you

Lydia Garvey Public Health Nurse
429 S 24th
Clinton OK 73601

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Lydia Garvey
429 S 24th
Clinton, OK 73601

Dear Ms. Garvey:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To whom it may concern,

A few years ago, I submitted a letter supporting the release of a biological agent to control the growth of Strawberry Guava in Hawaii. I'm writing again to reaffirm my support for this action. Having been a long-time volunteer with the Nature Conservancy on Maui, I have a great deal of experience working in Hawaii's native forests and have lamented the spread of noxious foreign plants, like guava, which further compromise the purity of Hawaii's unique native forests each year. There is no comparison to be made between the rich diversity of life in native forests and the biological uniformity of a guava thicket. There is also no excuse for failing to act to preserve native forests, especially when a well-researched biological agent is readily available as an alternative to the woefully limited methods of manual removal and chemical spraying, both of which are exceedingly difficult in Hawaii's rugged terrain.

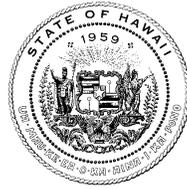
I'm sure that you're already well aware of the rigorous testing that has been done to determine the safety of the insect to be released, and I'm sure that you've heard the many practical and scientific arguments in favor of its use. However, as an artist rather than a scientist, I would also stress the beauty and aesthetic value of the Hawaiian forests, which are one of the great natural treasures in all the world - their preservation should always be the first priority, and Strawberry Guava is an immediate problem demanding immediate action. I strongly urge you to approve the release of the Brazilian scale bug to help contain the spread of this troublesome plant in Hawaii.

Thank you,

Kit Gentry

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Kit Gentry

Dear Mr. Gentry:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Subj: Introducing an alien insect to control
strawberry guava

Dept. of Agriculture Plant Pest Control Branch

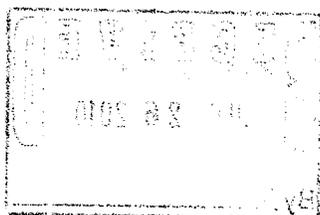
Dept. of Land and Natural Resources

Comment:

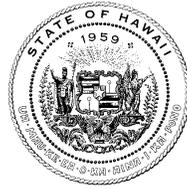
1. Please have a public hearing on this island (Kauai).
2. Regarding the picture of strawberry guava on the big island (Star Advertiser - Insight section A17 - Wed. 7/21/10). Frankly, the trees on the big island really do look ugly, not at all like the ones we have on Kauai. The strawberry guava here are a beautiful green reflected by the sun, the leaves just sparkle. I admire them every day in the valley. Beautiful in landscaping, and the trees are perfect in Japanese style landscapes. There are 2 in the state park across the street from Opaekaa Falls. Someone has pruned the trees artistically, something I would like to do. I often study the pruning as we go by. In these times when we speak so much about sustainability, what more than strawberry guava as food, eg. jams and jelly. If there were any pest trees one should get rid of, I feel the albezia trees should be #1 on the list.

You should have youths for a summer program like the CCC in the 30's and pay them to clear the albezia and strawberry guava trees by hand. They'll learn a lot from the experience.

Sincerely,
Elise Godfrey
335 Aina Mahi Pl
Kapaa HI
(808) 96746
ph - 821-0447



NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Elsie Godley
335 Aina Mahi Pl.
Kapa'a, HI 96746

Dear Ms. Godley:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 28, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about scenic values, please see FAQ No. 9. Regarding the impact of biocontrol on strawberry guava as a food source, see FAQ No. 8. As to your comments about other biocontrol targets and manual eradication methods, please see Nos. 2 and 4, respectively. With regard to albizia specifically, this invasive tree has recently come under consideration as a target for biocontrol, but the potential for discovering highly specific biocontrol agents that can be safely introduced is still unknown. The experience of land managers across the state indicates that strawberry guava is also a pervasive threat to Hawaiian forests and cannot be ignored.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

Public meetings on the proposed biocontrol of strawberry guava were conducted in Kauai in 2006 and 2009.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

JOHN J. GRIFFITHS, JR.
P.O. BOX 692
MOUNTAIN VIEW, HAWAII 96771
(808) 687-0966

July 4, 2010

Dr. Neil Reimer
Hawaii State Department of Agriculture
Plant and Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

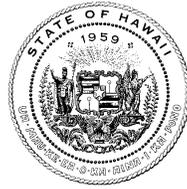
RE: Opposition to Bio Control of Strawberry Guava

Dear Dr. Reimer:

1. I have a strong opposition to the bio control of strawberry guava.
2. It is irreversible once this bio chemical is released.
3. You will have massive liability to private property.
4. This will cause strong damage to our environment.
5. This should not be done until an Environmental Study is done.
6. Me as a homeowner and having thousands of strawberry guava on my 23 acres, it will cause major damage to my property. In no way should this be done until a **complete Environmental Study** is done. The reason for this is because once this is done, it is irreversible. We as homeowners, enjoying the strawberry guava, will no longer be able to supplement our household with guava jam and feed our farm animals. This will cause substantial financial hardship to our family. Not to mention that our children will **NEVER** be able to enjoy another strawberry guava again.
7. I am requesting that this shall not happen.

Yours truly,


John J. Griffiths, Jr.



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

John Griffiths, Jr.
P.O. Box 692
Mountain View, HI 96771

Dear Mr. Griffiths:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 4, 2010, on the Draft EA. Your opposition to the biocontrol plan is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the impacts of the program to the environment, please see FAQ Nos. 3 and 5. Regarding its impact on fruit, see No. 8. As several of your other concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The action will be irreversible.

Although it is not yet certain that *T. ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

2. The government could be held liable for damages to trees on private property, and release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an

attractive tree. Complete defoliation is very unusual in Brazil and it would not likely happen here either. Considering this, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit fly pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts. Conversely, there might be minor increases in property values through the reduction in fruit fly pests, which gardeners and farmers may value.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. For example, construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

3. Environmental damage.

On the contrary, the project is expected to substantially benefit the environment by reducing one of the largest threats to native ecosystems.

4. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Comment on June 23, 2010
DRAFT ENVIRONMENTAL ASSESSMENT
Biocontrol of Strawberry Guava
by its Natural Control Agent
for Preservation of Native Forests
in the Hawaiian Islands

Comment by Soma Grismaijer, Director
Good Shepherd Foundation, Inc.
P.O. Box 1880, Pahoia, Hawaii 96778
Submitted July 16, 2010

To: State of Hawai'i
Department of Agriculture
1428 South King Street
Honolulu, Hawai'i 96814

State of Hawai'i
Department of Land and Natural Resources
1151 Punchbowl Street, Room 131
Honolulu, Hawai'i 96813

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai'i 96721

State of Hawaii
Office of Environmental Quality Control
Kinau Hale
1250 Punchbowl Street
Honolulu, HI 96813

I would like to make the following comment on this EA.

The Good Shepherd Foundation, Inc. owns a 67-acres nature preserve and animal sanctuary in Puna, on the Big Island. We have abundant strawberry guava in our forest, and use it as a food resource for the animals, wildlife, and ourselves. We also greatly appreciate the beauty of the strawberry guava, and use the wood for poles, construction, and fuel.

Each year I process and can about 3 dozen jars of strawberry guava jam and 3 dozen quarts of strawberry guava juice. At \$10 per can and jar, this comes to about \$720.

In addition, I use the fresh fruit to feed our goats, horses, sheep, and ourselves, using about 2,000 pounds. At \$2 per pound, this would amount to \$4,000 of fruit. If this is lost to this insect attack, we will have to replace that fruit with some other source of food, which would probably cost more than \$2 per pound.

We have about 10,000 strawberry guava trees, in various sizes, singly and in groups, which, in

addition to their resource value, we value for their beauty and the environment they create for wildlife, such as song birds, that enjoy the fruit. We estimate each tree is worth \$100 to \$1000, depending on size, location, and replacement costs. This places a value on our strawberry guava tree resource at anywhere between \$100,000 to \$1,000,000.

If this insect attacks our trees, it will create a financial loss and damage to our property and its usefulness and aesthetics. We would expect compensation for this loss and damage, including replacement of the trees.

In addition, I suffer from respiratory problems and allergies, and I am concerned that the presence of these insects in the environment may harm my health. It may also harm our animals. As I understand the EA, this insect releases eggs and nymphs into the air to travel with the wind. I live in an area with lots of strawberry guava along the roads and on our property, and I would expect any healthcare costs related to this insect release must be borne by the responsible State and/or Federal government agencies or individuals in those agencies that are promoting this release.

The EA does not discuss this liability for the State and Federal governments with regards to the health and property damage this insect will cause. There needs to be a full discussion and analysis of this cost, so the people and government agencies responsible for this plague can address the problem they will be creating. A compensation fund needs to be developed so the public can know that the government will pay for the damages and costs of this infestation.

Finally, I would like to express my extreme disgust and dismay that anyone, working for the government or otherwise, would have the audacity to release an insect plague on the environment and the people. It has shown me the evils of biocontrol and of the people who promote it. I will do everything in my power to fight this, in court if necessary, as this type of tyranny and disrespect for the private property rights of the people must not go unchallenged.

Bug Off! Find some other way to control the waiawi in the forests without blighting the state and the people with your pet insect projects!

Sincerely,



Soma Grismaijer

Director, Good Shepherd Foundation, Inc.



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Soma Grismaijer, Director
Good Shepherd Foundation
P.O. Box 1880
Pahoa, HI 96778

Dear Ms. Grismaijer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 16, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect's impact on fruiting, please see FAQ No. 2. It is first important to note that that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. However, as your comment letter involved a number of specific questions and observations, answers to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

2. The Department of Agriculture should instead find productive uses for strawberry guava.

There are some existing productive uses for strawberry guava wood that will not be affected in any major way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

The EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area).

Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. It should be noted that even after introduction of the scale insect, stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. Fruiting will be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

3. Release would violate private property rights.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

4. The government could be held liable for damages to trees on private property.

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of private property rights, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha!

Biological controls have a terrible history in these islands. Insects are the most dangerous to introduce because of their ability to multiply rapidly, but what I'm going to write about is the danger of harming the strawberry guava in the rainy areas of Hawaii.

The problem with guava or waiwi is it has taken over much of the forest, but that is done. These guava dominated forests hold most of the islands' healthiest top soil. If the waiwi dies back, you put at risk all that top soil washing down and out to sea. Only manual removal and replanting with native species is safe.

The only way to control it without risk is the way I've been controlling it for decades: Continuous cutting of the stumps, heavy mulch, and if need be, straight application of brush control agents to the stumps. I have done this with literally thousands of trees.

A much worse problem than the waiwi is the Miconia and we've almost eliminated it from our 16 acres in only 5 years while the neighboring gulches are choked with it.

Don't take the easy way out. If history teaches us anything, that easy way will be one you regret.

Malama pono

GB Hajim
Papa'ikou, HI

+++++



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

G.B. Hajim
Papa'ikou, Hawai'i

Dear Mr. Hajim:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 18, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about manual clearing and biocontrol of other species, please see FAQ Nos. 4 and 2, respectively. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Killing strawberry guava leaves ground susceptible to erosion.

Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil-holding plant species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion (p. 54). The forests of Hawai'i are important zones of water input that can be adversely affected by factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology. In fact, strawberry guava has been found to reduce recharge to the island aquifers compared to native forest.

Forests of eucalyptus on Maui, loblolly pine at Koke'e on Kaua'i, miconia on the Big Island, and strawberry guava statewide exhibit similar structural characteristics: a dense uniform canopy with very little understory. In native Hawaiian forests, the impact of raindrops is buffered by leaves of upper canopy trees such as 'ōhi'a and koa, and then again by leaves of subcanopy trees such as mehame, kopiko, hapu'u and kolea and again by epiphytes, ground ferns, mosses, and layers of decomposing branches and leaves. The forests also help block winds and retard evaporation. That is not the case with the dense stand structure and high foliage biomass of strawberry guava, suggesting that for many decades to come these forests will be diverting water that would otherwise recharge aquifers and streams (pp. 55-56).

Although, as you point out, strawberry guava can be controlled on small properties through diligent effort, the hundreds of thousands of acres of conservation land alone that are currently infested by strawberry guava are often inaccessible. Based on considerable experience with invasive species eradication efforts, we estimate that a one-time manual removal of strawberry guava in East Hawai‘i alone would cost about a third of a billion dollars. This is far beyond what most would consider the reasonable value of the endeavor.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long horizontal flourish at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture



Hanaoka Farm

PO Box 161 Hilo Hawaii 96721 (808) 968-8078

RECEIVED

'10 JUL 22 P12:27

DEPT OF LAND & NATURAL RESOURCES STATE OF HAWAII

July 20, 2010

Ms. Laura Thielen
DLNR

Re: Response to Strawberry Guava EA

Dear Ms. Thielen,

Writing on behalf of a group of farmers and nursery owners here at ground zero for proposed release of T.Ovatus, we would like to ask that you read the enclosed pages and consider our concerns.

Please ask the plan's authors to specify where the State derives the authority to potentially defoliate thousands of acres of private lands.

While a feeling of emergency has been deliberately encouraged in this plan's public relations campaign, the trees have been here for 185 years. We all have personal, daily interaction with our strawberry guava trees. They just don't move that fast. We ask that no decision be made until every alternative can be examined.

Mahalo for the thoughtful consideration of all aspects of this proposal.

Sincerely,

Shelley Hanaoka

STRAWBERRY GUAVA ENVIRONMENTAL ASSESSMENT

We all agree on the two main issues. All want to preserve native forests, and all agree that strawberry guava needs control. We appreciate the work of researchers and their concern for the health of the forest. But statements in this EA differ greatly from the plan that has been aggressively marketed to the public over the last couple of years.

The plan must be evaluated on facts, not spin

Rejection of this project is not a condemnation of biocontrol per se. However, this project has the potential for staggering damage, and honest assessment of the risks is imperative. All excerpts from the Strawberry Guava EA are in italics... “*Unlike other projects which may directly affect only a limited area...the proposed project treats vast areas of the Hawaiian Islands*”(p.34) “*Release at one site in Hawaii can be considered equivalent to release over the entire area of the State*” (p.1) Once released, the insect can never be called back. The decision is irrevocable...but “*There is some uncertainty associated with the effectiveness of T.Ovatus for control of strawberry guava...overall effectiveness will not be known until after release occurs and post-release monitoring is conducted*”(p.35) It is an experiment, taking place over thousands of acres of Hawaiian forest.

Rolling dice with the ecosystem – the risks are real

Proponents repeatedly claim that “*effects will be subtle and gradual*” but the EA clearly states, “*T.Ovatus appears to cause substantial damage to strawberry guava in Brazil...heavy infestations have been observed to cause defoliation ...multiple overlapping generations are observed each year.... Two generations are enough to stunt small potted plants*”(Appendix 1.1) Defoliation occurs in Brazil, where T.Ovatus coexists with natural predators. No predators for T.Ovatus exist in Hawaii. The balance held in its native Brazil is absent here. Extreme infestations and defoliation can logically be expected, directly contradicting the marketing claims. Weakened trees would also be more susceptible to secondary infections, with unknown consequences...and “*If other plant species were fed upon by T. Ovatus, resulting impacts could be environmental impacts not easily reversed.*”(p.86)

Biocontrol - There's no such thing as a sure thing

This EA and its proponents claim that there is virtually no danger... *"host specificity is 100%" (p.18) "Among 1,100 cases of weed biocontrol in the last century, rapid host range evolution to use non-target plants has never been documented"(p.86) ...but that is simply untrue. The EA's claim of near infallibility cannot be supported. There are many examples of recent biocontrol programs gone awry. The EA itself admits, "Worldwide, biological weed control programs have had an overall success rate of 33%"(p.36) that is, a failure rate of 67%.*

An honest assessment of the risk to Hawaii's ecosystem is imperative. Environmental Impacts of Biological Control (Russell Messing, UH Manoa 2002) states that 21% of the biocontrol agents released worldwide have moved to non-target species, including over 13% of those in Hawaii. One example: In a project reported in Conservation Magazine <http://www.conservationmagazine.org/2008/07/biocontrol-backfires-again/> A biocontrol agent tested 100% effective against the competitor of a native thistle in tests, but when released it immediately migrated to the plant it was intended to save, with disastrous effect. Many biocontrol backfires can be cited, but if this were to backfire, nearly half of Hawaii's landmass would be involved. It should also be noted that *"there is no known evidence that T.Ovatus has ever been exported outside its natural range previously"*(Appendix 1.1) Strawberry guava trees are present across the globe. Why should the first test release be in Hawaii?

Banned in Florida

"...there is concern in Florida about potential impacts from T.Ovatus on native psidium..."(p.47) T.Ovatus is a banned invasive insect in Florida and the Caribbean. Release of the insect here would add to the burden of our agricultural inspectors, causing potential delay or rejection of plant materials from Hawaii...and though fruit flies feed on strawberry guava as well as many other fruits, they will not disappear from Hawaii even if every strawberry guava tree in the state disappears.

The proponents have claimed a state of emergency in promotion of this project, yet they claim *"effects will be subtle and gradual...impacts (of*

T.Ovatus) are expected to occur over a period of decades...”(p.34) On the same page, they admit “*high levels of infestation have been observed to cause leaf drop to the point of defoliation*” Which is it? No one knows. It is possible that thousands of acres of currently healthy strawberry guava could look like the poor, stricken rose apple trees now seen, terminally ill, all across Hawaii. Th

What about alternatives?

This EA has a pronounced slant against the only alternative it presents, and argument to protect native forest areas suddenly expands to total eradication of this one species, no matter where it may grow. When the alternative of using strawberry guava as biomass is discussed, why does the EA extrapolate labor costs out to the cutting of every last tree on the island, with bulldozers, roadbuilders and helicopters invoked in scary scenarios? Labor costs are plucked out of the air - estimated by a consultant to be \$10,500/acre, then later listed as \$2000/acre (p.50), and still later as an unknown - “*current costs of strawberry guava control in parks, watersheds, and in road/utility corridors using herbicidal and mechanical methods are not well quantified...*”(p.53) Why not? Those would be the figures based on actual work done, using a method that the EA itself admits to be effective and specific. “*Dramatic reductions in the density of strawberry guava and other weeds have been achieved within these limited areas, and the labor to maintain low weed density declines after the initial large investment*” (p.30)

Strawberry guava as a valued resource

We are in the dawn of green energy technology and Hawaii is blessed with a natural resource of renewable biomass. The State of Hawaii has repeatedly voiced support for energy and food independence. The Hawaii Clean Energy Initiative was created to accelerate the use of renewable indigenous energy resources in Hawaii. A shift to biofuels has been mandated by the Federal Govt. and the USDA, among others, focuses on this opportunity (see <http://www.fs.fed.us/woodybiomass/>) Biomass, whether it be strawberry guava trees or algae, has a quantifiable value, and strawberry guava should be seen as a resource, not a curse. Strawberry guava is a hard wood with a high BTU rating that can be harvested with low-impact techniques. The slender trunks do not require heavy machinery to cut or transport, making contract harvest within the reach of small businesses. Proper resource management would encourage harvest of accessible tracts of unwanted trees to provide a source of both revenue and job creation; for specialists to maintain and extend invasive-free zones around threatened forest areas, for private crews to bid on harvesting of trees, both public and

private, and for reforestation crews, a central part of forest management on the mainland. One of the big gaps in this EA is the lack of a clear plan to reintroduce desired species. We all know there is no such thing as empty land. Though “*vast tracts*” could be defoliated, repopulation by desired species seems to be left to chance. “*In lowland areas already disturbed ...replacement of strawberry guava by primarily alien species is more likely than replacement by natives (p.41)*”

Hawaii’s future in green jobs and products

Electricity - In the U.S., biomass already provides 15 times more energy than wind and solar sources combined. Systems like Honolulu’s H-Power prove the technology works, and other biomass businesses want to enter the market. This same technology also solves landfill problems by converting waste to power. Small modular systems now exist so that individuals, farms and isolated areas can be energy independent, using their own biomass for their own electricity off the main grid.

Biochar – converts biomass into valuable (and carbon-negative) agricultural soil amendments. At present, thousands of bags of fertilizer and potting soil are shipped 3000 miles to Hawaii when they could be made right here, supporting local agriculture and allowing strawberry guava to give back to the ‘aina.

Pharmaceuticals – Recent university studies have shown that psidium cattleianum acts to suppress drug-resistant strains of staphylococcus and enterococcus, and may even be effective to combat varroa mites in bees. One egregious flaw in the EA’s analysis of strawberry guava is the omission of any mention of this research.

Food production – Hawaiian fruit juices enjoy far more demand than supply. Strawberry guava fruits are plentiful, nutritious and easy to process. It is sadly ironic that the EA claims as one of its successes the destruction of the banana poka vine. The release of biocontrols for banana poka in Hawaii wiped out the thriving lilikoi industry in the late 1990’s, collapsing yields by more than 75%. People are not aware that most passion fruit juice now consumed in Hawaii must be imported from South America or Indonesia.

Privately-owned trees and economic justice

Maps in this EA (note: not actual trees, but “*estimated potential*” trees) do not differentiate between state-owned and privately-owned properties, but many thousands of trees are privately-owned. In a disturbing

statement, the EA claims that *“the levels of uncertainty associated with the proposed action appear acceptable”*(p.87) First, the public has repeatedly been told there is no uncertainty, and second, acceptable to whom? In this plan, private owners have no voice in the diseasing or destruction of their property. The desire of the researchers to conduct this experiment overrides all. The EA suggestion that owners can simply *“spray horticultural oil”* to protect their trees, without regard for the height or acreage of these trees, is just silly.

In a recent class action lawsuit in Florida, the courts upheld a decision awarding over \$11 million to citrus tree owners whose healthy trees were destroyed by Florida’s Dept. of Agriculture. DLNR and DOA, as the permitting agencies, could be held liable for damage to private properties. Article XI Sec.9 of Hawaii’s Constitution provides the right for individuals to bring suit in matters regarding the environment. .. “nor shall private property be taken for public use without just compensation” Fifth Amendment, U.S.Constitution.

Article XI, Sec.1 of the Hawaii State Constitution provides, “for the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawaii’s natural beauty and all natural resources, including land, water, air, minerals and energy sources, and shall promote development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State” All citizens want to protect Hawaii’s native forests. Release of T.Ovatus is not the best alternative.

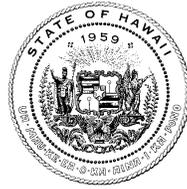
Hawaii Administrative Rules

1. Involves an irrevocable commitment to loss by subjecting vast acres of both public and private forest to insect infestation, with unknown consequences
2. Curtails the beneficial uses of the environment by diseasing, rather than utilizing, unwanted trees.
3. Conflicts with long-term environmental policies as seen in Article XI Sec.1 (above)
4. Substantially affects economic or social welfare of the State by risking destruction of a resource rather than promotion of its utilization.
6. Involves secondary impacts to the public – the risk that the insects will jump to ohia or other related trees – the job of treating or removing diseased, dying strawberry guava trees from previously healthy environments. .

7. & 12 – Degradation of environmental quality and scenic vistas – please refer to photos of T.Ovatus damage – and the EA clearly states that extreme infestation and defoliation are possibilities.

We urge the DOE and the DLNR to honestly examine the risks and thoroughly investigate other alternatives for protection of our native forests. Please support a moratorium on the T.Ovatus biocontrol program so that safer alternatives can be researched. Ask why the first test of this biocontrol should take place in Hawaii rather than a more isolated area, so that results and safety can better be determined. Strengthen safeguards against the accidental release of T.Ovatus. EA makes it plain that even one insect has the potential to cause eventual infestation of thousands of acres of (currently) healthy trees.

“



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Shelley Hanaoka
Hanaoka Farm
P.O. Box 161
Hilo, HI 96721

Dear Ms. Hanaoka:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. Regarding your concerns about biocontrol in general, see Nos. 3 and 5; concerning your comment about the impact of the scale insect on fruit, please see FAQ Nos. 8 and 10; for manual control, see FAQ No. 4; for evolution of the insect, FAQ No. 5; for impacts to households, FAQ No. 8; and for scenic impacts, FAQ No. 9

However, as your comment letter involved a number of specific questions and observations, answers to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. State's authority to implement biocontrol efforts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects. Under statute and policy, the State of Hawai'i has been directed to implement management of invasive species that threaten the integrity of our natural and cultural resources. Such management includes the use of biological control for widespread, severely damaging species which are not amenable to control by other means.

2. Plan evaluated on facts/not spin; experimental nature of biocontrol.

We respectfully disagree with your criticism regarding the objectivity of the EA and the validity of the arguments and data presented. The EA presents facts, not spin. Although any management action carries a degree of uncertainty, this is a project that land managers and environmental scientists almost universally agree is needed immediately, and whose outcome can be reasonably well predicted because of extremely careful research.

3. Severity of impacts from biocontrol; "eradication" of strawberry guava

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the

scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. The biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We do not concur with your conclusion that the EA underestimates expected impacts of the biocontrol in Hawai‘i. Reduction in vegetative growth due to *T. ovatus* was measured in Brazil in cages which excluded natural enemies of the scale insect. Impact on fruiting was estimated on trees at a site where natural enemies were not likely to be abundant. Impacts of *T. ovatus* vary considerably from site to site and even tree to tree in Brazil, probably due to a variety of effects (including natural enemies and relative timing of insect dispersal and tree growth). Observations of maximally infested trees are the basis for conclusions on expected impacts of this biocontrol. It has never been observed to kill even small potted plants under extremely high infestation levels. Maximum impacts of the scale insect observed in Brazil are not likely to be exceeded in Hawai‘i, and this level of impact is associated with dense galling of leaves affecting most foliage on a plant.

4. Biocontrol not a sure thing.

It appears that you have misunderstood the meaning of biocontrol success and failure. When the “success rate” of biocontrol efforts is cited in the EA, it refers to the percentage of projects that resulted in substantial to complete suppression of targeted weeds. Conversely, projects considered less than successful resulted in partial to negligible suppression of weeds. Unsuccessful projects were merely not effective; failure in this case does not mean that unintended consequences with negative environmental impacts have occurred. While it is true that some past biocontrol projects have had effects on nontarget species, the occurrence of these effects has been almost entirely predictable using protocols for host-specificity testing that have been standard in biocontrol research for decades. The claim that there are many examples of recent biocontrol programs gone awry is untrue. In Hawai‘i we have successfully avoided nontarget effects with all of over 50 biocontrol introductions since strict standards were put in place around 1975. Prior to this period, potential effects on native nontarget species were also predictable, but either went unconsidered or dismissed as unimportant. The scientific basis for using biocontrol safely and effectively is in fact very strong, and the proposed biocontrol for strawberry guava has been rigorously tested and reviewed in Hawai‘i.

5. Scale insect banned in Florida; additional burden on agricultural inspectors

All exotic insect species are restricted from entry to the U.S. pending evaluation of potential risks. It is a mischaracterization of the facts to claim that *T. ovatus* has been banned in Florida. In truth it is under consideration for biocontrol, but such consideration is more complex there than in Hawai‘i because of the presence of possible nontarget plants in the Caribbean region. Release in Florida may yet be approved, but only if risks are judged to be sufficiently low based on the best evidence.

Movement of the scale insect between Hawai‘i and Florida would most likely only be possible on live strawberry guava plants with galls, which can be readily detected by visual inspection. Transport of eggs and nymphs on other plant species may be possible, but their establishment in Florida or other destinations is exceedingly unlikely because eggs of *T. ovatus* hatch within a few days and nymphs survive only 1-2 days and can only crawl a short distance before they must find young leaves of a suitable host plant. Quarantine restrictions on the movement of plant material are based on risk; the risk of *T. ovatus* being transported undetected is minimal and presents negligible burden on agricultural inspectors.

6. The biocontrol effort won't effectively reduce the fruit fly problem.

The potential for strawberry guava to sustain fruit flies and ruin other agricultural crops is well known. For example, in Florida, the protocol for certifying fresh citrus fruit to be fruit-fly free involves having the crops

located at least 1.5 miles from strawberry guava, whether wild or within the landscape of a residence (p. 13). As stated in the EA, attempts to manage fruit fly pests in Hawai‘i are severely constrained by the abundance of fruiting strawberry guava. (You may be interested to learn more about fruit flies at www.fruitfly.hawaii.edu.) Researchers who have worked extensively with farmers say that with almost every crop studied, the number-one problem interfering with broader management of fruit flies was the impact of strawberry guava (p. 13). They estimate that 95 percent of fruit fly populations can originate from wild common or strawberry guava stands. In windward wet climates, strawberry guava is the predominant host, providing breeding grounds for high populations of fruit flies that can attack orchard fruits up to five miles away (p. 51). Biocontrol of strawberry guava by itself will not eliminate problems with fruit fly pests, but it will be highly beneficial for Hawaiian agriculture if strawberry guava fruit can be reduced as a source of fruit flies. Then other fruit fly management strategies will have a chance to be much more effective.

7. Estimates of the cost of manual control not consistent

Your confusion here is a result of comparing apples and oranges. The estimate of \$10,500 per acre is for manual chopping and spraying to eradicate strawberry guava in an area reasonably near roads; the \$2,000 figure is to prepare an area for koa silviculture, which would likely involve full site access and heavy equipment. As calculated by the many agencies actually performing strawberry guava management in Hawai‘i, costs for manual control vary between \$250 per acre to over \$25,000 per acre, being greatly dependent on the density of the infestation. The calculations in the EA (prepared not by a “consultant” but by a UH professor who was not paid) use these data from the National Park Service and other sources to estimate conservatively the costs for control across large landscapes. These data are intended to illustrate the particular challenge that management of this widespread aggressive invader presents in the absence of biocontrol. These are the harsh facts, not just a scare tactic.

Please note that although public and private land managers across the state have abundant experience in manual control of strawberry guava, the current overall costs of its management in parks, watersheds, and road/utility corridors has not been quantified because not all of these data are readily available. As noted in the EA, these costs are likely to be considerable, and they will only increase with time.

8. Strawberry guava as a resource/green jobs and products

There are some existing productive uses for strawberry guava wood that will not be affected in any major way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

The EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. It should be noted that even after introduction of the scale insect, stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. Fruiting will be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

9. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than

replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

10. Banana poka biocontrol's impact on lilikoi.

Release of biocontrols against banana poka have not impacted lilikoi in Hawai'i. There is no documentation of lilikoi in Hawai'i ever being attacked by the biocontrol agent *Septoria passiflorae* that was released to control banana poka. Diseases on lilikoi are caused by generalist pathogens unrelated to the biocontrol.

11. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

Biocontrol of strawberry guava in Hawai'i is not analogous to cases of citrus tree destruction in Florida, because the effects of biocontrol will not interfere to any substantial degree with the value of privately owned trees. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

12. Hawai'i Administrative Rules significance criteria

Although we agree if the action is successful it will be irrevocable, it will lead to improvement of the environment, not degradation. This is a key difference. The trees will not be "diseased" any more than the native plants that have hundreds of co-evolved predators can be considered to be diseased. We do not concur that the action conflicts with long-term environmental policies, but rather we see it as a fulfillment of them. No resource will be "destroyed" and there is thus no significant impact to social and economic welfare. The risk of the scale insect evolving and infesting other trees has been evaluated and determined to not be credible. The level of galls on strawberry guava will be similar to that on 'ōhi'a and banyan and will not pose any noticeable impact to scenery.

Although it is not yet certain that *T. ovatus* will survive and effectively inhabit strawberry guava forests in Hawai‘i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.

Plant Pest Control Branch Chief

Hawai‘i Department of Agriculture

July 18, 2010

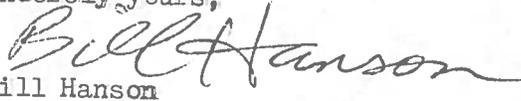
Bill Hanson
P.O. Box 133
Ninole HI 96773

Mr. Paul Conry
Administrator of Division Forestry & Wildlife
1151 Punchbowl St. Rm 325
Honolulu Hawaii 96813

Aloha Mr. Conry,

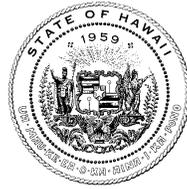
Given all the indisputable evidence showing how strawberry guava is damaging our environment and its irreversible damage it will have on native forests and watershed I hope you will call for the release of the bio-control scale insect. Thank you.

Sincerely yours,

A handwritten signature in cursive script that reads "Bill Hanson". The signature is written in dark ink and is positioned above the typed name.

Bill Hanson

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bill Hanson
PO Box 133
Ninole, HI 96773

Dear Mr. Hanson:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 18, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Re. 2010 06-23 ST-DEA-Biocontrol Strawberry Guava
Aloha,

I support efforts to control the invasive strawberry guava by its native control insect.

Strawberry guava crowds out and takes over habitat for native plants and animals. It degrades watersheds. It threatens Hawaiian cultural sites and plants and animals that Hawaiian culture is tied to. It supports fruit flies which damage produce and make export of some plant products difficult. Chemical and mechanical control are inadequate.

Biology of the Brazilian scale insect and years of host specificity studies show that this insect is a good option for long-term management of strawberry guava. 15 years of testing has shown that the bug will only survive on strawberry guava; not on 'o'hia, koa, or other species of guava. Pigs have many other food sources besides strawberry guava fruit..

The insect will not kill off all strawberry guava, only slow its growth rate to help save our native forests.

Mahalo for considering my comments.

Cory Harden
PO Box 10265
Hilo, Hawai'i 96721
mh@interpac.net
808-968-8965

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Cory Harden
P.O. Box 10265
Hilo, HI 96721

Dear Ms. Harden:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawai'i Department of Agriculture Plant Pest Control

Dear Folks,

I support the proposal to introduce introduction of the scale insect as a biocontrol to help in control efforts to thwart the invasive strawberry guava.

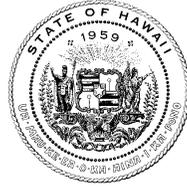
Currently strawberry guava is one of the most serious threats to preservation of native ecosystems, and the only effective control relies on excessive uses of herbicides, themselves a threat to the environment. This proposed biocontrol agent results in decades of studies to find a suitable agent for guava control. I heartily endorse its use.

Sincerely,

Bryan Harry

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bryan Harry

Dear Mr. Harry:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 27, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dear Hawaii Department of Agriculture

This letter is regarding the draft EA for the Biocontrol of strawberry guava.

As a conservation biologist who has studied the dynamics of Hawaiian forests for the past 15 years, and as a field researcher who has hiked and camped through the most inaccessible forests in the state, I can attest that if we do nothing to slow the spread of strawberry guava, our forests will become a vast pig and mosquito infested guava thicket from sea-level to tree line within 100 years.

I understand that there are some people that object to taking action against the spread of this weed, on the grounds that they occasionally eat its fruit or make use of its wood. We should not let people focused on their own limited self interests make short-sighted decisions that will affect all future generations of people in Hawaii. Our diverse and unique forests are found nowhere else on earth and are a precious natural heritage. Our great-grandchildren deserve to experience the magic of these places. By doing nothing and simply letting “nature run its course”, our unique forests will be lost forever. We need to support attempts, including biocontrol, aimed at reducing the spread of this weed.

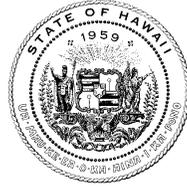
In its natural habitat in South America, strawberry guava has many natural predators and competitors that prevent it from taking over the forest. In Hawaii, none of these natural factors exist. We humans have completely disrupted the natural balance of the forest - Biocontrol is the only tool we have left to restore that natural balance.

sincerely,

**Patrick J Hart
Assistant Professor
Department of Biology
University of Hawaii at Hilo
Hilo, HI 96720
(808)974-7645**

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Patrick J Hart
Assistant Professor
Department of Biology
University of Hawai'i at Hilo
Hilo, HI 96720

Dear Professor Hart:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Strawberry Guava Trees

I've read the arguments for bio-control of strawberry guava trees in Hawaii. I might understand the state's position if bio-control of a new Brazilian scale insect was specific to forests areas with which the state is concerned. However, to introduce in Hawaii a new, unable to be controlled Brazilian scale insect, which will damage and/or wipe out strawberry guava trees on all properties, including tourist and residential areas, is very unfair and seems wrong.

To argue that this Brazilian insect will not cause any other environmental damage other than to the strawberry guava cannot be proven until after it is introduced when it will be too late.

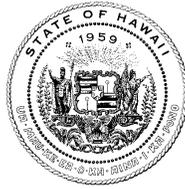
To say that the non-native strawberry guava should be controlled and eliminated allowing other native and non-native plants to survive also seems a strange argument to me. Weren't all plants in Hawaii non-native at one time? Weren't all plants introduced here at sometime in the past?

My husband and I have lived in Hawaii 45 years. Fifteen years ago we planted a strawberry guava tree in our garden in our yard. It is a beautiful, small tree with fruit we enjoy. To subject our tree to indiscriminate, ugly insect galls on its leaves or tree elimination from a Brazilian insect seems an unwanted, unfair incursion on our property rights.

J. Heavenridge
Hawaii Kai



Ms. Janet F. Heavenridge
7214 Kuaehu St.
Honolulu, HI 96825-3101



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Janet Heavenridge
7214 Kuaehu St.
Honolulu, HI 96825

Dear Ms. Heavenridge:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comment about testing of the scale insect, please see FAQ No. 6. Regarding the role of strawberry guava in the Hawaiian environment, see FAQ No. 1. As for the biocontrol's effects on scenic values and fruit sources, please see Nos. 9 and 8, respectively. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

2. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of

native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

3. All plants in Hawai'i are non-native.

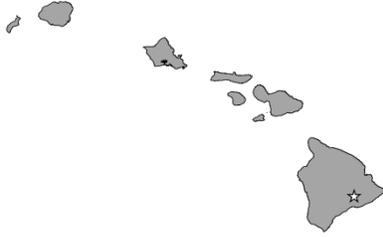
The plants in Hawai'i that biologists call natives were introduced by wind, sea and birds over the course of many millions of years. Since that time, many have evolved to constitute what is considered one of the most wonderful ecosystems on the planet, a showcase of evolution. In the last 200 years, introductions of plants to Hawai'i have increased many orders of magnitude beyond the pace of previous natural introductions. Human activities continue to alter the natural ecosystems of these islands, and we must take responsibility for these effects by preserving and managing our island ecosystems to our best abilities.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

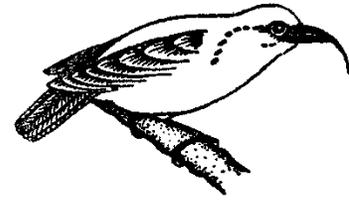
Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer". The signature is written in black ink and is positioned above the typed name and title.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



STEVEN C. HESS, PH.D.
19-4335 Alanui Iiwi
P.O. Box 1091
Volcano, Hawai'i Island
HI 96785-1091



To whom it may concern,

July 21, 2010

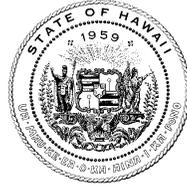
As a citizen of Hawai'i, I would like to express my strongest support for the release of the Brazilian scale insect (*Tectococcus ovatus*) as a biological control agent for the highly invasive strawberry guava (*Psidium cattleianum*). Strawberry guava is one of the worst invasive species throughout the Hawaiian Islands and even in the State of Florida within the continental U.S. I believe there has been a great deal of misinformation and fear mongering promulgated by small, vocal special interest groups to prevent the release *Tectococcus ovatus* as a biological control agent. These groups have spread hysterical propaganda that there has not been adequate study of the scale insect 'evolving' and jumping to other species. However, there has actually been a great deal of rigorous scientific study and strong evidence for host specificity in this organism, not only in Hawai'i, but in Florida and in its native Brazil. No one can claim there has been inadequate study unless they have an extensive academic education in biological control and they have evaluated every scientific publication about the use of this organism as a biological control agent for strawberry guava. Moreover, the environmental assessment of this scale insect as a biological control agent has already been subject to the strictest adherence to State and Federal law and policy.

The primary benefit of biological control for strawberry guava will be to prevent its spread into the most pristine natural areas throughout Hawai'i. Existing areas badly invaded by strawberry guava are not likely to be affected by the scale insect and the claim that these trees will be damaged on private property is completely false and unfounded. The claim that the scale insect will cause respiratory distress in humans is absurd. It is also unlikely that the scale insect will have any noticeable effect on the amount of harvestable fruit, as special interest groups claim, nor should this consideration outweigh the protection of numerous native plants and animals in Hawai'i's forests. If landowners are concerned about the scale insect, they only need to spray their trees with a solution of soap. The release of the Brazilian scale insect as a biological control agent for the highly invasive strawberry guava should proceed as soon as possible for the conservation of plants and animals that make up an important part of Hawai'i's natural Heritage. Obstructing this measure will only result in further ecological degradation and extinction.

Sincerely,

Steven C. Hess

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Steven Hess, Ph.D.
P.O. Box 1091
Volcano, HI 96785

Dear Dr. Hess:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 21, 2010

✓Hawai'i Department of Agriculture Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

cc: DLNR, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, HI 96813

RE: Strawberry Guava Bio Control – strongly oppose

To Whom it may concern

I oppose the proposed strawberry guava bio-control proposal because I do not believe – based on experience and long years of observation – that data- and statistical-based studies can “prove” introduction of an exotic species will behave as “expected.”

If there are funds available for this particular proposal, I believe they would be better spent on manual removal of the stawberry guava in area immediately threatening said native species on State land. Alternatively, how about an initiative to strengthen native species and help them develop the wherewithal to fend off not just strawberry guava, but the other myriad exotics which are yearly inadvertently introduced?

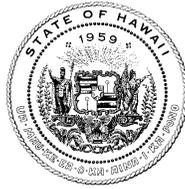
If the proposal is driven by grant funding, the monies being offered should be in the tens or hundreds of millions because that's what introducing yet another exotic species into an already-complex ecosystem will likely cost ultimately.

Sincerely,



Leilani S. Hino
Ahualoa, Big Island
PO Box 909
Honokaa, HI 9727

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Leilani Hino
P.O. Box 909
Ahualoa, HI 96727

Dear Ms. Hino:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about biocontrol in general, please see FAQ Nos. 3, 5, and 6. Regarding your comment about manual eradication, please see FAQ No. 4. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The project will waste money and not achieve desired results.

In its native Brazil, where it has its own enemies, the scale insect results in a 25 to 40 percent reduction in vegetative growth rate and 60 to 90 percent reduction in fruit and seed production (p. 35). The anticipated reduction in fruiting and vigor of strawberry guava that would result from the proposed action would substantially benefit vegetation management efforts and increase the ecotourism value and the value of ecosystem services provided by native forests in Hawai'i (p. 55). The biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and anyone interested in using strawberry guava for fruit or wood will be able to do so.

In regard to costs, please note that biocontrol projects tend to be far more cost-effective than other means of managing widespread pests. For example, a recent biocontrol project has saved the wilwili tree from the brink of extinction caused by an alien wasp at a cost of a few hundred thousand dollars, a tiny fraction of the what is spent managing invasive species every year in Hawai'i.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I've had the opportunity to work on several projects that are directly related to the Strawberry Guava situation. If you have any experience in conservation you soon find there are few if any layers of society in Hawaii that are not threatened by this plant.

Unfortunately very few of us have the practical, first hand or close up look at this water greedy and destructive pest. Today, for the majority of us, we can still turn on our faucets and enjoy affordable fresh water.

The paradise Hawaii for most of us is really the high cost of living in the middle of the Pacific Ocean. Pristine native forests and creatures occupy the lower tiers of day to day concerns. High mortgages, gasoline, food, health and education costs are paramount.

For the sake of argument, try adding less fresh water to the list. And if you can, tell me how this one factor is not going to significantly alter how we all live in "Paradise".

As I understand it, this Bio Control project is about slowing down the relentless spread of Strawberry Guava. It will not wipe it out. Manual control or removal is really not effective. I've been in the field and have seen how incredibly labor intensive, expensive and ineffective it is on the large scale.

I've talked to pig hunters and they all have said they prefer hunting native forests that are easier to traverse. Some Strawberry Guava thickets are nearly impossible to penetrate. Also, the diversity of hunting in native ecosystems as opposed to a mono Strawberry Guava one is more appealing.

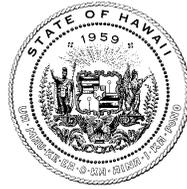
For me personally, I cannot see a Hawaii without her native forests. Even though I live a more terrestrial life, I tend more to the aquatic. With Strawberry Guava being such a valid threat to our watersheds, the negative consequences to our near shore resources is a nightmare I would rather not live to see and experience.

I support the application of Bio Control in regard to the Strawberry Guava situation.

Cal Hirai
Independent TV producer
"Outside Hawaii"

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Cal Hirai
Independent TV producer
"Outside Hawaii"

Dear Mr. Hirai:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

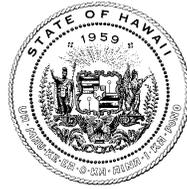
"GN Hisashima"

I am very concern with the government (County,State, and Federal) and how they address protecting the environment. I have followed a lot of Environmental problems that affect the Main Hawaiian Islands which was caused by the Government. There were many species that was allowed to enter the Hawaiian Islands by the government. The long time affects of each species were "Assumptions" no clear scientific study to determine the post affects of each species. The State of Hawaii introduced the Taupe, Roi, and Toau to provide fishes for the people of Hawaii. Now, these species of fish are pests that are killing the juvenile Deep Seven species. Where was the post study affect of these fishes?? Assumptions that they would not be a pest, well check itout today. Miconia, allowed to enter as a ornamental plant, now what was the assumption? Not a problem, very nice ornamental plant. The "Endangered" Hawaiian Monk Seal brought from the Northern Hawaiian Island to the Main Hawaiian Island and transplanted on each Island for it's survival. When are the environmentalist going to admit that they are only accepting the funding to prolong what the natural result would be? No more Monk Seal!! A common person like me can make assumptions like the Government and say that all of the studies done comes to one conclusion, it is not the environment but the genetics of the species that's killing off the Monk Seal.

Now the focus on funding for studies and eradication of the Strawberry Guava. Here go again study and make recommendations for the funding of this project. What don't the government understand? Nothing here on the Main Hawaiian Islands are indigenous to the land.. Everything living species was introduced to these Islands by nature. You are fighting a loosing cause. By introducing another species to control a pest, you will be studying the affects of this pest and how to rid of them in the future when it mutates to other plants. **STOP USING THE HAWAIIAN ISLANDS AS A PETRI DISH FOR YOUR RESEARCH!!!!**

When will the government start prioritizing where to spend funds? On Endangered Species or on People? Too many times the Tax Payers of this Nation are taking a back seat to all of the concerns of the Conservationist who are looking for monies to perpetuate their job employment. There is a perception that the "Endangered Species" takes precedence over people problem. Pay the unemployed to eradicate the Strawberry Guava in the traditional way, by hand. Stop filtering the funds to the Conservation groups who have large bank accounts.

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State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

G.N. Hisashima

Dear Mr. Hisashima:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your comment letter dated June 25, 2010, on the Draft EA in which you express your concerns as a hunter and about government actions in the past. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about manual clearing, please see FAQ No. 4. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The project will waste money and not achieve desired results.

In its native Brazil, the scale insect results in a 25 to 40 percent reduction in vegetative growth rate and 60 to 90 percent reduction in fruit and seed production (p. 35). The anticipated reduction in fruiting and vigor of strawberry guava that would result from the proposed action would substantially benefit vegetation management efforts and increase the ecotourism value and the value of ecosystem services provided by native forests in Hawai'i (p. 55).

2. Endangered species should not take precedence over people.

The proposed action would benefit both endangered species and people in substantial ways, through improvement of watersheds, reduction of the spread of thickets into hunting and recreational areas, and preservation of ecosystem diversity, which has myriad human benefits. It would also benefit Hawai'i's agriculture – improving our self-sufficiency and potentially increasing exports.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Comments on Draft Environmental Assessment, Strawberry Guava Management

As a hunter, I spend significant time in Hawaii Island forests and am very familiar with the proliferation of waiawi. I have no philosophical opposition to controlling its spread in forest reserves and other publicly-owned lands.

My concern with proposed use of the biological control agent *Tectococcus ovatus* is twofold: First, it is non-selective and non-recallable. In time it will migrate from initial release areas to infest all island plants.

I have waiawi on my property. I value its fruit and utilize its wood. I don't want these plants weakened or destroyed. Release of this opportunistic and uncontrollable agent constitutes the unauthorized taking of my property, which the state has no right to do.

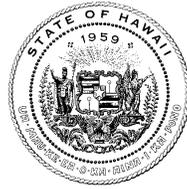
Secondly, I have serious concerns over the unknown and likely unknowable consequences of releasing *Tectococcus ovatus* into Hawaii's diverse environments. While significant testing may have occurred in controlled environments, no one can foresee with certitude all possible long term impacts of introducing this alien species.

While undoubtedly less cost effective, I would support more precisely targeted measures to control waiawi that do not incorporate the risk and adverse collateral impact inherent in the method proposed.

I oppose release of the Brazilian scale insect as an agent for strawberry guava management in Hawaii for the reasons indicated.

Richard Hoeflinger
HCR 1 Box 5344
Keaau, Hawaii 96749
hilodik@gmail.com





State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Richard Hoeflinger
HCR 1 Box 5344
Keaau, HI 96749

Dear Mr. Hoeflinger:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 13, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the scale insect targeting other plants, please see FAQ No. 5. Regarding your concern about the loss of strawberry guava fruit and wood, see No. 8. As for your comments about biocontrol and about other methods of controlling strawberry guava, see Nos. 3 and 4, respectively. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

2. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of

native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Nancy Hoffman
Kāneʻohe, HI

July 20, 2010

Dr. Neil Reimer
Hawaiʻi Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawaiʻi Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawaiʻi's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is necessary to protect Hawaiʻi's native forests.

On the island of Oʻahu, strawberry guava thickets carpet vast swaths of the Koʻolau and Waiʻanae Ranges. I have been in dark thickets of strawberry guava covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawaiʻi. Strawberry guava grows sparsely in Brazilian forests.

Oʻahu's forests should be dominated by native species such as ʻōhiʻa (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that ʻōhia, koa, and any other native seeds never have a chance to sprout.

On Oʻahu, our forests are so degraded that ʻōhiʻa and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Koʻolau and Waiʻanae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawaiʻi do. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawaiʻi's native wiliwili trees were threatened with extinction in 2005 due to the accidental

introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai‘i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give ‘ōhi‘a and koa seeds a chance to sprout.

Like Hawai‘i’s language and culture, Hawai‘i’s forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava’s natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,
Naomi Hoffman

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Naomi Hoffman
Kaneohe, HI

Dear Ms. Hoffman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

nick.david.holmes@gmail.com

To whom it may concern

Re: DRAFT ENVIRONMENTAL ASSESSMENT – Bio-control of Strawberry Guava by its
Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

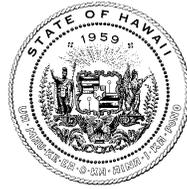
I fully support and encourage the expeditious release of the scale insect from Brazil, *Tectococcus ovatus*, for biological control of strawberry guava, (*Psidium cattleianum*).

Regards

Nick Holmes

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Nick Holmes

Dear Mr. Holmes:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

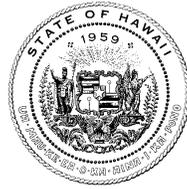
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I love to eat the fruit, but the trees completely take over the forest. Enough is enough. I wholeheartedly support release of the insect to slow down the spread of Strawberry Guava.

John Hoover
PO Box 648
Volcano, HI 96785
808 985 9906

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

John Hoover
P.O. Box 648
Volcano, HI 96785

Dear Mr. Hoover:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

**P.O. Box 2004
Honokaa, Hawaii 96727
(808) 640-3181**

July 3, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

I am writing in strong opposition to the proposed project titled: "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands". In the letter sent with the CD of the Draft Environmental Assessment, the location is listed as "statewide" and the District and TMK number are both listed as "not applicable". It is immediately apparent that if the Brazilian scale insect is released, this biocontrol agent will spread throughout the entire state and ultimately produce the unsightly galls and damage to the strawberry guava trees statewide. This process will be irreversible and all consuming. It will damage every tree in the state, not only on public lands, but in every single piece of private property. The biocontrol agent knows no boundaries.

My wife and I live in a rural area on the Big Island and enjoy the strawberry guava tree as an ornamental fruit tree. We use the wood and the fruit. The thought of seeing our trees damaged and being destroyed on our private land by a biocontrol agent over which we have no control is abhorrent.

As a 43 year Hawaii physician and knowing how bad our state's asthma risk can be, I am very concerned about the spread of eggs and nymph insects on the wind. I believe the allergenic potential is very real. I would hope that our state DOA and DLNR would put a stop to this planned biocontrol program. At the very least we must all demand a thorough environmental impact statement as this proposal will certainly have a huge impact throughout our state.

Sincerely yours,



Fred C. Holschuh, M.D.

Cc: Mr. Paul Conry
Hawaii DLNR, DOFAW

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Fred Holschuh M.D.
P.O. Box 2004
Honokaa, HI 96727

Dear Dr. Holschuh:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 3, 2010, on the Draft EA expressing your opposition to the biocontrol release. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the impact of the release aesthetically and on production of fruit and wood, please see FAQ Nos. 9 and 8, respectively. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The action will be irreversible.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

2. Release would violate private property rights.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

3. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

4. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 23, 2010

Dr. Neil Reimer
Hawai'i State Department of Agriculture,
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawai'i 96814

Dear Dr. Reimer,

Aloha

Founded in 2002, the 43,175 acre Leeward Haleakalā Watershed Restoration Partnership (LHWRP) was formed by ten private and public landowners to begin watershed restoration and reforestation of regional Koa forests.

We fully support and encourage the release of the carefully tested strawberry guava (*Psidium cattleianum*) biological control agent, *Tectococcus ovatus*, by the U.S. Forest Service.

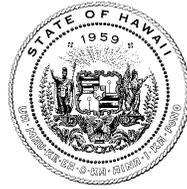
Respectfully submitted,

Sunnie Hueu

Leeward Haleakala Watershed Restoration Partnership
www.lhwrp.org
808)573-8989

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sunnie Hueu
Leeward Haleakala Watershed Restoration Partnership

Dear Ms. Hueu:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To whom it may concern,

I spend most of my days outside. I have been working with plants for nearly fifteen years now in botanical gardens, residential landscapes, farms large and small and with native plant and habitat restoration. I received a Bachelor of Science from UH Hilo in Agroecology and Environmental Quality in 2004. I own a three acre fruit orchard where I live with my wife and kids and eat food from our land. In other words my relationship with Strawberry guava and its place in the environment is based on experience both personal and professional.

PLEASE RELEASE THE STRAWBERRY GUAVA BIOCONTROL. Strawberry guava is obscenely overbearing wherever it takes hold. Biocontrol would not eradicate the plant but reduce it to a level where it could be more appreciated and less hated. All of the schemes I have heard to control the plant by other means make no ecological sense; in a nutshell deforestation causes massive topsoil erosion and other collateral damage.

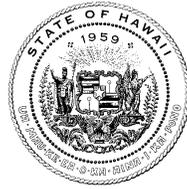
PLEASE RELEASE THE STRAWBERRY GUAVA BIOCONTROL. Long past are the days when half-baked biocontrol blunders, such as the mongoose, have happened. There are hundreds if not thousands of recent success stories of using biocontrols to solve invasive organism problems.

Many thanks to all of those who are responsible for finding and testing the biocontrol for Strawberry Guava and Thanks in advance to those responsible for enabling it's release.

Josiah Shelton Hunt
www.landscapeecology-hawaii.com

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Josiah Shelton Hunt

Dear Mr. Hunt:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

As a taxpayer and strong advocate for an all-hands-on-deck approach to extreme threats like strawberry guava, I appreciate the opportunity for comment. Because protection of natural resources requires decision-making based on the best science available, I hope that comments will be weighted according to their reasoning and supporting facts. Many of the comments that I have seen opposing the biocontrol plan tout the virtues of the tree without discussing its harmful characteristics. Other comments state directly that the tree is not a problem. However, the evidence is all to the contrary. Therefore I am hopeful that the heartfelt but invariably poorly supported arguments against strawberry guava biocontrol and the findings in the new EA will not prevail.

The facts are that strawberry guava already dominates an enormous amount of land that was once healthy watershed, and it is taking more as we debate. Watershed managers need assistance with control. All residents need healthy watersheds, whether they think about watersheds or not. Principles of adaptive management argue for taking action in this situation, basing that action on the best science at our disposal, and adapting and improving the plan as results become available.

I SUPPORT the strawberry guava biocontrol release and the findings in the draft environmental assessment: Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands.

Mary Ikagawa, Kailua

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mary Ikagawa
Kailua, HI

Dear Ms. Ikagawa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha HDOA,

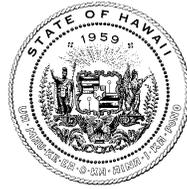
Strawberry guava is perhaps the most difficult invasive plant to impact Hawaii ecosystems. It completely wipes out everything in it's path and is difficult to remove. It would never be allowed into the state at this point, but it is too late. Biological control is the only viable option and should be implemented as soon as possible, before even more native habitat is lost forever. Time is critical. The economic value of the plant is minimal, and when you calculate the loss of habitat, it is COSTING our state most likely millions in our of labor for eradication and lost watershed services. Hopefully these negative economic impacts are calculated into the cost of allowing strawberry guave to persist in Hawaii.

Sincerely,

J. Mark Ingoglia, Taxpayer
5584 Pia Street
Hon, Hi 96821
391-2490

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

J. Mark Ingolia
5584 Pia Street
Honolulu, HI 96821

Dear Mr. Ingolia:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 13, 2010

Hawai'i Department of Agriculture

Plant Pest Control Branch

1428 S. King St.

Honolulu, HI 96814

Dear Sirs,

Aloha, I am writing this letter to address my concerns regarding biocontrol for the Strawberry Guava. I am for biocontrol in some cases however; I am not for biocontrol in the case of the Strawberry Guava. There are a lot of other invasive plants out there that are a lot worse. I am 30 years old now and I have been in the mountains of Kaua'i almost every weekend since I was 15 years old. I am a hunter! Since I have been in the mountains of Kaua'i, I have noticed a lot of changes with the surroundings of nature in the past 15 years. The Strawberry Guava has taken a long time to get established but not in a negative way. It provides fruit for a lot of birds, animals and people.

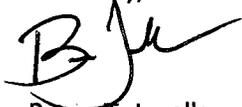
Some people use the Strawberry Guava for jam, the wood for fine wood and branches including the leaves for smoking meat. Most people travel to the mountains to hike, hunt or even just to enjoy what it has to offer as a family activity. What is the first thing most people, especially the locals, look for when out and about in the mountains? Most times it is something that nature can provide for you to eat. The Strawberry Guava is one of them. More than likely the Strawberry Guava is the first ripe fruit they will see that is available for the taking. It's not a rapid growing type of tree. It actually takes more time than other invasive plants.

Clydemia, on the other hand, is a very bad plant/shrub on makalea mountain. Within 7 years it has taken over so bad, that it is established over a huge part of the island of Kaua'i. What would happen if the Strawberry Guava dies? What will take its place? Since biocontrol has been introduced for the Rose Apple tree and the Rat Berry trees, the Clydemia has found its place. I feel that this is worst. This plant/shrub should be at your top level of importance. Second, is the Albezia tree. Third, the Australian Tree Fern. Fourth, the Myconia vine. Fifth the Cat Claw. Sixth, the Blue Bush. Seventh, is a shrub vine that grows about knee to a little past knee high, in which I do not know the name. In the past 2 years it has been quickly spreading. These types of shrubs, vines and trees, provide nothing good for the island and they are the ones that will take over Kaua'i.

I am not sure how long you've been studying biocontrol on the strawberry guava, But, I speak for myself as a person who loves the mountains and the community of Kaua'i, when I say that it would be a big mistake to use biocontrol on the Strawberry Guava. Who knows what new invasive plant, tree, shrub, and/or vine that will grow in the next five years? The only person or people who will know are the ones that are always in the mountains that have seen firsthand what can happen when you use biocontrol to get rid of the so-called "pests".

I hope you take my letter in to consideration, to do the right thing. Save the land, nature and the pure beauty of Kaua'i.

Sincerely,

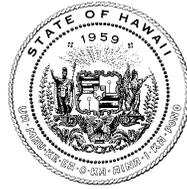


Bruce T. Javellana

P.O. Box 275, Anahola, Kaua'i, Hawai'i 96703

cc: DLNR

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bruce Javellana
P.O. Box 275
Anahola, HI 96703

Dear Mr. Javellana:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 13, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about other targets for biocontrol, please see FAQ No. 2. Regarding your comment about the role of strawberry guava in the Hawaiian environment, please see No. 1. And as for your comments about the supply of fruit and wood, please see Nos. 8 and 10. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

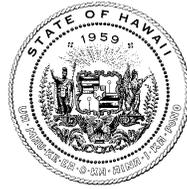
I am writing in support of the proposed strawberry biocontrol. I spend a lot of time in our native forests across the state and have seen the widespread impacts of waiwi on our native ecosystems. It completely displaces Ohia (and everything else) leaving dense thickets of only strawberry guava. The biocontrol will not eliminate waiwi but slow growth and reproduction. Hawaii has successfully implemented biocontrol for Opuntia and Pamakani to keep pastures viable. We need to remember these success.

While we cannot impose our values on others it is hard for me to understand choosing waiwi (which was introduced to Hawaii only slightly over 100 yrs ago) over Ohia, our endemic forest tree that is the backbone of our native ecosystems. Our native forests are disappearing and Hawaii is known as the endangered species capital of the world. It is time to change this trend.

Mahalo,
Jennifer Johansen

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jennifer Johansen

Dear Ms. Johansen:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

**P.O. Box 72
Paauilo, Hawaii 96776
(808) 776-1425**

July 3, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

Thank you for allowing me to submit comments in strong opposition to the proposal to release the Brazilian Scale insect to control strawberry guava. Many of us have families that go back generations living in agricultural communities. Many of my friends and neighbors, even if they are recent arrivals to our state, live in rural areas. I and members of my family enjoy the use of the strawberry guava fruit. We also use it to create borders that allow for wind, dust, and noise control. I consider strawberry guava to be a desirable ornamental fruit tree.

The letter accompanying the Draft E.A. states: the location is statewide and that the district and TMKs are "not applicable". Clearly, this bio-control insect will spread throughout the entire state destroying strawberry guava on all lands, public and private. If this bio-control agent only affected strawberry guava in forests on state land, the private property rights would not be an issue. This clearly will not be the case and the resulting damage to my privately owned trees on my property will necessitate compensation to me and thousands of other people by the state. Additionally, as a long time hunter, I can tell you that the destruction of the strawberry guava trees will allow for overgrowth of way more objectionable species such as Clydemia. There are so many potentially negative consequences of the release of this bio-control insect that an Environmental Impact Statement must be done.

As a lifelong resident who loves this land, I implore you to not allow this reckless and objectionable program to continue.

Sincerely yours,



Waltham Johansen

Cc: Mr. Paul Conry
Hawaii State DLNR, Division of Forestry and Wildlife



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Waltham Johansen
P.O. Box 72
Paauilo, HI 96776

Dear Mr. Johansen:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 3, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the impact of strawberry guava and of the scale insect on the fruit, please see FAQ Nos. 1 and 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

2. The government could be held liable for damages to trees on private property.

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would

lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of private property rights, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

3. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

4. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu HI 96814

Dear Madam or Sir,

This letter is in support of biocontrol for strawberry guava.

We are Hawaii residents who volunteer throughout Hawaii Island including Hawaii Volcanoes National Park. There is strawberry guava in the vacant land behind our home. Any strawberry guava that was in our yard has been removed using herbicide and much labor. We have seen areas of strawberry guava and hiked as best we can through them. It is quite prevalent in almost every area we visit. Unfortunately it grows dense and crowds out anything else.

Having a biocontrol agent will assist in controlling this invader. The plant does have a purpose but is very out of control and invading natural areas. The biocontrol will provide another tool in maintaining Hawaii's diverse beauty. The affect strawberry guava has on soil and water is another large concern. It displaces other plants and no other plants grow in the area.

We strongly urge allowing the biocontrol agent to be released in an effort to keep Hawaii the beautiful, unique, and diverse state that it is.

Sincerely,

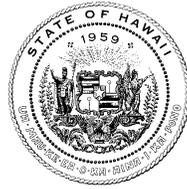
Carol Johnson

Mark Johnson

969 Ainako Ave
Hilo HI 96720

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mark Johnson
Carol Johnson
969 Ainako Ave.
Hilo, HI 96720

Dear Mr. and Mrs. Johnson:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box 17
Paauilo, HI. 96776
July 7, 2010

Dr. Neil Reimer
Hawaii State Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI. 96814

Dear Doctor:

Aloha,

My name is Kuekaa Jones. Thank you for allowing me to express my opinion on the release of the Brazilian Seale to "control waiwi" (Biocontrol of Strawberry Guava)

As a tax paying member of this community, I would expect an Environmental Impact Statement, before, the release of any animal, Insect or plant that could change our way of life.

We have lived with waiwi all of our life. Waiwi Season is welcomed every year. This fruit is made into wonderful jellies and syrups.

The Brazilian Seale does not understand Property lines or "my" waiwi; it will Kill waiwi not just "state" waiwi

I Love to hunt and spend many hours tracking ~~through~~[^] waiwi and Clydemia.

In my opinion, clydemia is the more invasive and less useful therefore, more should be done to "control" Clydemia than waiwi

Sincerely,

Kuekaa Jones



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Kuekaa Jones
P.O. Box 17
Paauilo, HI 96776

Dear Mr. Jones:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 8, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about using the fruit of strawberry guava, please see FAQ No. 8. Regarding other species for biocontrol, see No. 2. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

2. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

3. *Release would violate private property rights.*

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

4. *Problems with clidemia.*

We agree that clidemia is invasive and that it has no productive uses. *Clidemia hirta* remains a high priority target for biocontrol research in Hawai'i. HDOA is currently evaluating a new agent which may prove valuable in managing this weed in wet forest environments such as in Hamakua. However, please note that our experience indicates that strawberry guava is an even more pervasive and serious threat to Hawaiian forests.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dept. of Agriculture
Plant Pest Control Branch

Dear Sirs,

As an active hiker for over 30 years, as a forest student and as a resident of Oahu I want to add my endorsement of the proposed release of a natural biocontrol agent to inhibit the spread of strawberry guava.

Having reviewed the very thorough testing of the proposed agent, it is my view that the State of Hawaii would be failing in their role as responsible land managers, if they had a tool such as *Tectococcus ovatus*, and did not use it. To do nothing is to condemn thousands of acres of native and semi-native forest to destruction by strawberry guava. Surely no one who has entered the thousands of acres of forest where the strawberry guava has crowded out all other trees and plants, left a landscape without understory and a monoculture growth rampant in fruit flies, would want more native forest overrun.

I endorse the use of *Tectococcus ovatus* throughout Hawaii.

Respectfully submitted,
Lloyd Jones

1616 Hoaaina Place
Honolulu Hawaii 96821

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Lloyd Jones
1616 Hoaina Place
Honolulu, HI 96821

Dear Mr. Jones:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

one person said when ^{the} genie is
of the bottle there is no way to put
back!

Please do not go forward with
it!

Thank you.

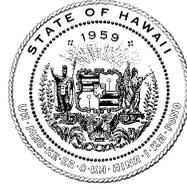
Sincerely,
Sue Jordan

Thursday

Dear Sir;

I am very concerned at the
aspect of the strawberry guava
being destroyed. They provide excellent
screening and in my yard screen
my house from street noise. I
would hate to lose ^{that} protection.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sue Jordan
1177 Maunawili Rd.
Kailua, HI 96734

Dear Ms. Jordan:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA in which you express your concern about the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about the scenic impacts from the plan, please see FAQ No. 9. As your other concern differed from the list, our response to that specific comment follows.

1. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

June 28, 2010

To: Hawaii State Department Of Agriculture, Plant Pest Control Branch

Attention: Dr. Neil Reimer

Subject: Biocontrol Of Strawberry Guava

Dear Dr. Reimer:

I am submitting my comments regarding your department's proposal to remove Strawberry Guava by use of biological agents, in this case scales. First of all, this is not the first time that the State or other branches of this corrupted Federal government has used these methods to target a certain species for eradication or control. In some past instances there were no EIS statements released or in some cases no one in the Government or Special interest group wants to accept the responsibility because of the future consequences that may occur (As with the recent introduction of the Ohia Rust that wiped out the Rose apples throughout the State of Hawaii. No one claims to have any knowledge of how it was introduced, nor will they accept the responsibility, due to any law suit that may occur in the future. No EIS draft was made available to the general public. It just goes to show how radical these environmental constituents are, including Botanists, and Biologist that represents these groups.

What you are trying to do is have the Hawaiian people submit to this fantasy world of Environmentalist and Change our lifestyle and our Islands into the way you choose it to be. This is just another form of Ignorance on behalf of arrogant white men from the U.S. I call it Piracy all over again.

I will give you a few examples of the failures and irreversible damage that the State or others have created on the Island of Kauai, that have gone bad using biotechnology as means of control. My first recollection was the Plantations introducing Tilapia to control algae in their irrigation streams. Today instead of our rivers being filled with O'opu Nakea or Opa'e, the Tilapia has flourished and they feed on the smaller O'opu and Opa'e. The damage is irreversible. Later on as time passed, it was the State that released the Small Mouth bass. Another predator to the O'opu, Opa'e and this native specie of shrimp recently discovered in Makaleha Stream. The damage or threat is now irreversible. The Cattle Egret was introduced by the State to control cattle flies. Rather than targeting the cattle flies as expected, it has become a nuisance and hazard on the airport runways. The State had to spend additional money to control or keep these birds off the Runways and this spending continues until this day. I have witnessed the egrets deep into the

mountains feeding on green frog tadpole or babies. They spend a lot of time fishing near the rivers. They have also preyed upon baby pheasant chicks and even rats. My whole point is that it was introduced to control one thing and it turned bad. The population is growing and the damage is irreversible. The State along with the former Honolulu Mayor Jeremy Harris was responsible for introducing the yellow perch for whatever reason. Today our reefs are infested with this bony fish with sharp teeth and it has been found to be in the mouth of the Kalihiwai River. This is also a predator to our locally enjoyed reef fish and now the native O'opu too. Irreversible! The Ohia rust was precise in wiping out the rose apple throughout the State, however now that it has killed all of the apples, there is a Mango tree up on the Wailua side of the Power line trail that is experiencing exactly the same symptoms of this virus. The tree flowers and the shoots wilt and die. The leaves are spotted like rust and the tree fail to give fruit. The flowers fall off and die. Could the rust be spreading to our Mangoes. We will find out soon.

The Clidemia was here long after the Strawberry Guava, but it has managed to overtake and spread faster than the Strawberry Guava. Yet no one has chosen to eradicate this invasive specie. It has not yet established itself on West Kauai but I'm certain that with the proposal to control the Strawberry Guava, Some angry resident will spread the seeds throughout West Kauai soon. I suppose this would not be too bad for environmentalists as they are in constant search for reasons to Sue the Government to have their way or to apply for additional grant monies so that they can have easy income for doing nothing but complaining or using Scientist to write false data and deceive the public with their scientific theories.

If you create something that would wipe out the clidemia, then I would support your plan, however it is clearly evident that if you slow or kill the strawberry guava, the clidemia would take its place. This is a weed that has no use to man or beast and it has spread three times faster than the guava. If this scale ever transfers to the regular guava our local favorites that we grew up feasting on, will all be gone forever. All because of The Nature Conservancy group and all of its allies. At the Straw berry Guava informative session held on Kauai, one of the spokespeople for this plan, could not guarantee us that this scale would not attack something else. Your EIS states that it may feed on plants similar to strawberry guava, or else in plain language, regular yellow guava. This is a plan of deception. Deception is the favorite tool of the devil and those who represent him.

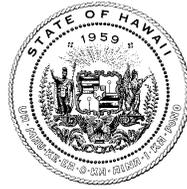
Lastly, the Albisia trees that are overtaking the mountains were not as evident back in the 70's. The State was going to allow Bill Cowern, who plants trees near Knudsen Gap, at halfway bridge on Kauai, to expand planting these trees above the Wailua River adjacent to the fern grotto. These trees are more invasive than the strawberry guava, it grows 10 times taller, multiplies 10x faster, does more damage with its giant roots as far as choking out the native plants and crowds out the sunlight from anything trying to grow beneath it. And yet the Special Interests people have not recognized this as a problem. Not even to the watershed and it is a problem, regardless of what any botanist may say. Its weak branches pose a great

threat to hikers, cars and are a potential liability to the State. Address these issues first and I might support your cause. If you kill the S.G., Kalepa Mountains will have nothing to support its soil from erosion and you would cause more damage to the watershed because you have already killed off what we call the "Ratberries". When the Rose apple and the German bush or what we call rat berries were killed by this type of means no environmental impact statement was released. Today when we drive by Knudsen Gap and look toward the Hoary Head mountain range the environmentalists have created more of an eyesore, not to mention a fire hazard. This has happened all over the forests areas and now what? Will the environmentalists go and plant native plants to restore the greenery that they have damaged? Or will they just let it sit until some new weed takes its place? Your claims are that the Strawberry Guava attracts most of the fruit flies. Then I must ask you what happened with the strain of fruit fly released to combat the common fruit fly and make it Sterile? This was just another failed attempt by the state and now you're blaming the Strawberry Guava. The big mosquito that was released to feed on other mosquitoes was also a failure. Today instead of having less mosquitoes we have both kinds flourishing in this environment. Rather than the Government give all these different lazy environmental groups grant monies for doing nothing, we should instead create jobs for our youth replanting native species and manually or chemically removing invasive weeds. They did this way back in the days of the depression (In the Lihue Koloa forest reserve on the way to Blue hole) however it were not a native tree that were planted it was the so called Paper Bark type trees.

I don't think any of this means anything because politically the State is going to allow it anyway. However we have learned a lot from the Super ferry issue. I supported the Super ferry. It was again a handful of lazy surfers and environmentalists that put a stop to it. A group of 1000 friends went to court and put a stop to it. We have more than a 1000 people who do not support this and I suppose we can do the same and sue the State when this thing gets out of hand.

Jason Kauai

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jason Kauai
7021 Pomaikai St.
Kapa'a, HI 96746

Dear Mr. Kauai:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 28, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your concerns about biocontrol in general, please see FAQ Nos. 3 and 5. Regarding your comment about other targets for biocontrol, see No. 2, and for manual control, see FAQ No. 4. As a number of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Failures of biocontrol and other introduced species.

Although we have referred you to FAQs Nos. 3 and 5 regarding this subject, we would also like to address some of your comments. First of all, we must make it clear that no agency of the State or federal government introduced the *Puccinia* rust which has infected rose apple and other species. It is one example among many hundreds of organisms introduced to Hawai'i inadvertently through trade and travel that have come to have harmful effects. In fact, such introductions are the reason for careful scientific biocontrol efforts, not a reason against them. While it is true that some species introduced in the past for biocontrol or other purposes have developed into pests themselves, all introductions for biocontrol since 1975 have adhered to strict standards for specificity and have been found to be safe in our environment. Many of these biocontrols suppress serious pests, and Hawai'i has benefited greatly from their introduction.

Among the examples you cite, only the cattle egret was actually introduced with the intent of providing biocontrol – in the 1950s. Like the familiar examples of the cane toad and mongoose, introduction of vertebrate animals was abandoned long ago by biocontrol scientists because such organisms are simply not specific enough.

The disease you have observed on mango is not the same *Puccinia* fungus killing rose apple, because this particular fungus can infect a variety of plants in the Myrtaceae family but none outside this family. For more information on diseases of mango you might consult this University of Hawai'i website:

<http://www.ctahr.hawaii.edu/nelsons/mango/>

For more information on the *Puccinia* fungus: <http://pubs.usgs.gov/of/2010/1082/>

2. *Problems with albizia and clidemia.*

We agree that these species are invasive and seriously threaten Hawaiian forests. *Clidemia hirta* remains a high priority target for biocontrol research in Hawai'i. HDOA is currently evaluating a new agent which may prove valuable in managing this weed in wet forest environments. Albizia has recently come under consideration as a target for biocontrol. The potential for discovering highly specific biocontrol agents that can be safely introduced to help manage this tree is currently unknown. Please note that the experience of land managers across the state indicates that strawberry guava is also a pervasive threat to Hawaiian forests that we cannot ignore.

3. *Removing strawberry guava just invites other invasive species to take hold.*

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

4. *Killing strawberry guava leaves ground susceptible to erosion.*

Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil-holding species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion (p. 54). The forests of Hawai'i are important zones of water input that can be adversely affected by factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology. In fact, strawberry guava has been found to reduce recharge to the island aquifers compared to native forest.

Forests of eucalyptus on Maui, loblolly pine at Koke'e on Kaua'i, miconia on the Big Island, and strawberry guava statewide exhibit similar structural characteristics: a dense uniform canopy with very little understory. In native Hawaiian forests, the impact of raindrops is buffered by leaves of upper canopy trees such as 'ōhi'a and koa, and then again by leaves of subcanopy trees such as mehame, kopiko, hapu'u and kolea and again by epiphytes, ground ferns, mosses, and layers of decomposing branches and leaves. The forests also help block winds and retard evaporation. That is not the case with the dense stand structure and high foliage biomass of strawberry guava, suggesting that for many decades to come these forests will be diverting water that would otherwise recharge aquifers and streams (pp. 55-56).

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Mr. Reimer and Mr. Terry:

I live on the island of Lana'i, and have watched the strawberry guava overtake our precious watershed. I am writing to express my full support for the expeditious release of the scale insect from Brazil, *Tectococcus ovatus*, for biological control of this invasive plant (*Psidium cattleianum*).

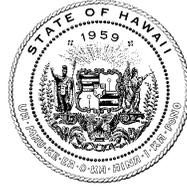
Mahalo,

Robin Kaye

P.O. Box 631313
Lanai City, HI 96763

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Robin Kaye
P.O. Box 631313
Lanai City, HI 96763

Dear Ms. Kaye:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

TO: Dr. Neil Reimer
State of Hawai'i, Department of Agriculture,
1428 South King Street
Honolulu, Hawai'i 96814

Ron Terry
Geometrician Associates
PO Box 396
Hilo, HI 96721

FROM: Sally Kaye, resident
511 Ilima Ave. P.O. Box 631313
Lana`i City, HI 96763
565-6276

RE: DRAFT ENVIRONMENTAL ASSESSMENT – Bio-control of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

I fully support and encourage the release of the scale insect *Tectococcus ovatus* for biological control of strawberry guava.

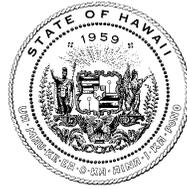
I have lived on Lana`i both full and part time for the past 36 years – beginning in 1974. During that time we have watched the decline of our watershed and the forest on the Hale with much dismay. The change – for the worse – is evident to those of us who live here and we welcome any agent that will stall and even reverse the loss of species and habitat that we see so clearly. Strawberry guava was rare 30 years ago, now it is choking out all in its path.

I also understand from those who work on the Hale and in the surrounding area that strawberry guava is the most significant threat to the continued existence of the Hawaiian petrel colony recently discovered here, and I fully support this effort to better manage, if not eradicate, this dreadful threat to our single watershed and habitat.

I have reviewed the EA and find it thorough, credible and to the point: no action is not an option and this action will only benefit our island and our state.

Thank you for this opportunity to comment.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sally Kaye
511 Ilima Ave.
Lana'i City, HI 96763

Dear Ms. Kaye:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

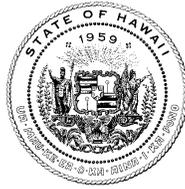
Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha Dr. Neil Is there plans to wipe out the strawberry Guava??And if so by what means? Im wondering because I would like to go and cut some for personal use if thats possible?Around the area of Honoka'a.Can u please let me know if I need a permit or if I can just cut it .Thank You
Ron Keeling

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ron Keeling

Dear Mr. Keeling:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 22, 2010, on the Draft EA, indicating your interest in the project, which is meant to benefit native species conservation, watersheds, and agriculture. Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. Depending on where you are interested in harvesting wood, this may require a permit from the state. Please contact your Big Island DOFAW office (DLNR Division of Forestry and Wildlife) for more information.

Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. For more details, please consult the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your comments. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

magnal

Date: July 23, 2010

PAGE 1 OF 2

To: Hawai'i State Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814



To: Hawai'i State DLNR
Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, HI 96813

From: Josephine Keliipio
Kailua-Kona, Hawaii 96740

Re: BIOCONTROL OF STRAWBERRY GUAVA BY ITS NATURAL CONTROL AGENT
FOR PRESERVATION OF NATIVE FORESTS IN THE HAWAIIAN ISLANDS –
Draft EA

The following are my comments to this extremely SHORT-SIGHTED and BIASED draft EA:

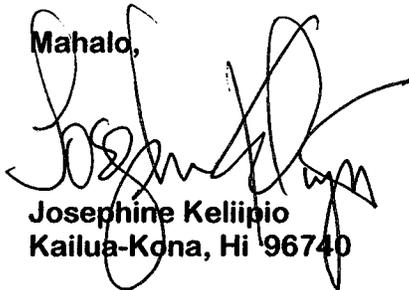
- 1) In light of the fact that Hawai'i is currently undergoing an economic crises that could last for years with thousands of people currently unemployed, I find it disturbing to read the details of how "expensive" and "labor-intensive" it would be to manually control the strawberry guava on State land when the problem could instead be viewed as an excellent EMPLOYMENT OPPORTUNITY for the unemployed. Your document fails to thoroughly address the positive employment aspects of manual control and how this could in fact help the economy. It is obvious that you were too lazy and too biased to do research on grants that could finance the costs of removal. Shameful.
- 2) Fruit flies have been around in Hawaii for generations so I find it most disturbing that you have again intentionally failed to provide the details of the fruit fly's history in Hawaii and that the strawberry guava was NEVER the reason why the fruit fly is a problem today. You neglect to tell us how the University of Hawaii built a large research facility in Manoa Valley in the 70s specific to studying fruit fly sterilization but those studies apparently failed. You fail to also address why the researchers have failed to come up with a bio control agent for the fruit fly. You also fail to tell us that the real reason why there is a fruit fly problem is not because of the strawberry guava but rather because the UH researchers working in their expensive facility HAVE FAILED in their research.

- 3) You provide **NO** analysis of how **GLOBAL WARMING** and **FURTHER HUMAN DEVELOPMENT** will **ALSO** negatively affect native forests. Without any thorough discussion in these areas, your document cannot be considered complete.

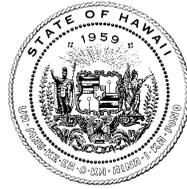
- 4) You again provide **NO** analysis of the modern medicinal value of the strawberry guava **FRUIT**. I saw nothing discussed about the high vitamin C content of this fruit and how deficient our diets are in vitamin c and how if we ate more of this fruit, we could actually lessen heart disease. Without adequately addressing the health benefits of this fruit or providing balanced information on the fruit's real health benefits and how our health could be extremely compromised once the effects of the insect are realized, your document again cannot be considered complete.

- 5) Your draft EA is not only biased by it **FAILS** to do an adequate job of addressing all of the issues. You should be required to do an Environmental Impact Statement instead.

Mahalo,



Josephine Keliipio
Kailua-Kona, Hi 96740



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Josephine Keliipio
76-168 Royal Poinciana Dr.
Kailua Kona, HI 96740

Dear Ms. Keliipio:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about manual eradication of strawberry guava, please see FAQ No. 4. Regarding your comment about using biocontrol to eradicate fruit flies, that is outside the scope of this study but please see FAQ No. 2 for more information as to why strawberry guava is the chosen target. As for your comment about the fruit, see FAQ No. 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Manual control.

Please see FAQ No. 4. In addition, although removal of strawberry guava certainly would constitute an opportunity to employ many thousands of people in Hawai'i, there are no sources of funding large enough to make this happen. Many of our public agencies and private citizens already have first-hand experience controlling strawberry guava at costs of many thousands of dollars per acre, but these efforts have made extremely limited progress against this plant. Manual control alone does not present a feasible or sustainable solution. The scope of the invasion of strawberry guava is simply too great. As noted in the EA, biocontrol is needed to prevent strawberry guava invasions from spreading further and to allow native species to better compete. Addition of biocontrol as a tool can provide us a means to manage existing forests and possibly restore degraded forests. To the extent that these efforts become more sustainable as a result of biocontrol of strawberry guava, it actually will enhance economic opportunities for our citizens working to preserve Hawaiian forests.

2. The biocontrol effort won't effectively reduce the fruit fly problem.

As briefly noted in the EA, a collaborative effort between USDA-ARS and the University of Hawai'i has over the last decade undertaken managing pest fruit flies over large areas of agricultural production in the state. The tools for this program are products of research on some of the technologies you mention, use of sterile flies and biocontrol agents, as well as good practices such as careful removal of ripe fruit from crop fields and selective, targeted use of insecticides. You may be interested to learn more about the program (www.fruitfly.hawaii.edu). This approach integrating a variety of control tactics to suppress pest populations over large areas has proved

successful for a number of major pests across the U.S., including now fruit flies in Hawai'i. However, as the EA states, these attempts to manage fruit fly pests in Hawai'i are severely constrained by the abundance of fruiting strawberry guava. Researchers who have worked extensively with farmers say that with almost every crop studied, the No. 1 problem interfering with broader management of fruit flies was the impact of strawberry guava (p. 13). They estimate that 95 percent of fruit fly populations can originate from wild common guava or strawberry guava stands. In windward wet climates, strawberry guava is the predominant host, providing breeding grounds for high populations of fruit flies that can attack orchard fruits up to five miles away (p. 51).

The potential for strawberry guava to sustain fruit flies and ruin other agricultural crops is well known in other locations. For example, in Florida, the protocol for certifying fresh citrus fruit to be fruit-fly free involves having the crops located at least 1.5 miles from strawberry guava, whether wild or within the landscape of a residence (p. 13).

We do not claim that biocontrol of strawberry guava by itself will eliminate problems with fruit fly pests, but it will be highly beneficial for Hawaiian agriculture if strawberry guava fruit can be reduced as a source of fruit flies. The other fruit fly management strategies will then have a chance to be much more effective.

3. Other threats to native forests.

You are correct that Hawaiian forests face negative impacts from a number of major threats, including climate change and development. Preserving native forests will require serious efforts on many fronts. A detailed discussion of all threats and management approaches for addressing them is beyond the scope of the current EA. Please note that land managers across the state agree that the uncontrolled spread of strawberry guava is among the gravest threats to native forests. With or without global warming and reckless development, our forest management efforts likely will prove futile unless we begin to effectively limit the spread of strawberry guava.

4. Strawberry guava is valuable as a medicine.

The issue of strawberry guava as medicine was discussed in the EA. Since its introduction to Hawai'i roughly 180 years ago, strawberry guava has become known in Hawaiian as waiawī (the yellow variety) and waiawī ula'ula (the red variety). None of the cultural practitioners consulted identified any traditional cultural practices or belief associated with strawberry guava (p. 60). While there was some discussion about the use of guava leaves for medicinal purposes such as a treatment for diarrhea, it was clearly the kuawa, or common guava, that was being referred to, not the strawberry guava.

Strawberry guava is by no means the only source of vitamin C in Hawai'i, nor is there evidence that it is consumed any more than very occasionally by the vast majority of residents. Hawai'i is blessed with a great diversity of healthy fruits for our population, and strawberry guava will remain among these even with the introduction of biocontrol. The biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

Furthermore, it appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

5. *An EIS should be done because the project may have significant impacts.*

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long horizontal flourish at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

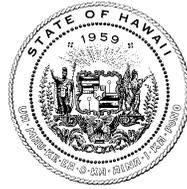
Hello. I am a longtime hiker through the mountains of Oahu who has noticed the growing intrusion of strawberry guava trees in many places. Though I like these trees, they are clearly crowding out other native plants and causing various ecological problems. I would support your plans to adopt the program of introducing an agent which will curtail the growth of the guavas.

Mahalo

Noel Kent Professor UH Manoa

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Noel Kent
Professor, UH-Manoa

Dear Professor Kent:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is an essential step towards protecting Hawaiian forests.

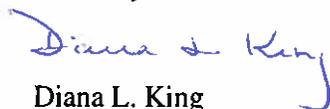
On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava stretching as far as the eye can see, where nothing else grows and the ground is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water available in soils, streams, and groundwater systems.

O'ahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead many are overrun by strawberry guava. It reproduces in such numbers that monoculture forests ensue, effectively blocking germination of other species. On O'ahu, many of our forests are so degraded that native species such as 'ōhi'a and koa are pushed back and up to the far reaches of our mountain ranges. But even those areas are vulnerable. Strawberry guava trees grow at the summits of both ranges and will inevitably spread if left unchecked.

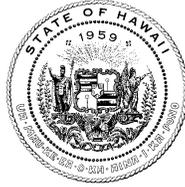
T. ovatus, the biocontrol agent under consideration, has been tested for more than 10 years and is shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai'i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava, but it will slow its spread, giving the native forest a chance to compete.

Like our culture, Hawaiian forests are unique, the species in them found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava's natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,


Diana L. King

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Diane King
1167 Luna'ai St.
Kailua, HI 96734

Dear Ms. King:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I am writing to support the strawberry guava biocontrol release. I have read the EA, which did an excellent job of assessing impacts and benefits, and I agree that there is low probability of any negative impacts, while I do feel that the benefits are likely to be substantial.

I'm a subsistence farmer and have been strongly influenced by the permaculture and natural farming strategy of designing biological systems to be self-regulating, in order to save on human effort. This is what I try to do on my farm, and is exactly what biocontrol does. It is the only realistic option for dealing with strawberry guava as the problem is so immense that it is out of the question to attempt to manage guava by manual means alone.

As a landowner with a 3 acre farm and 9 acres of dedicated native forest, I am responsible for improving that forest. I was able to quickly kill the fast-growing weed trees (albizia, cecropia, melochia and trema), but I am only very slowly chipping away at the guava, which I like to call "monster weed," focusing on those that are surrounding the 'ohi'a trees that are dying off due to (I think) competition with the thickets of guava that surround them. There is zero regrowth of 'ohi'a or hala, as their keiki cannot grow up beneath the guava thicket, so the sad fate of this forest without intervention would be a canopy of guava with, perhaps, an understory of clidemia and/or melastoma, and no native species. I do some "killing" of guava nearly every day, and then about a year later I kill it again, using a fair amount of herbicide each time.

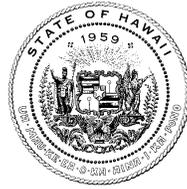
On my farm, the fruit fly problem is severe, causing much of the fruit I produce to be infested with maggots. I long ago stopped eating strawberry guava as the fruits are teeming with maggots when ripe, and this is true of many fruits and vegetables that I have attempted to grow over the years. I eat exclusively from my land, and this loss of food is significant to my quality of life. I no longer even try to grow tomatoes, cucumbers, melons, or most squashes. At least half of my citrus is infested with maggots, as well as virtually every Surinam cherry, grumichama, mulberry, and white guava that I harvest. Bananas must be harvested green and let to ripen indoors to prevent infestation. Only when I read the EA for this project did I first hear from an outside source that strawberry guava is thought to be responsible for our heavy infestations of fruit flies, but I had come to that same conclusion myself years ago after traveling to other tropical fruit-growing areas that had nowhere near our levels of infested fruit despite having the same fly species. This connection is now obvious to me, as I see the maggot-filled strawberry guavas covering the ground in the forest next to my farm, and in the following months have higher than normal fruit fly infestation in the crops I grow. I can hardly wait until *Tectococcus ovatus* is released to help slow the spread and reduce the fruiting of strawberry guava. I only hope that it is as effective as we hope it will be.

Mahalo for hearing my comments!

Ann Kobsa
RR2 Box 3338
Pahoa, HI 96778
808-965-6273

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ann Kobsa
RR2 Box 3338
Pahoa, HI 96778

Dear Ms. Kobsa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 18, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the kind of hard work you have done removing strawberry guava, the proposed biocontrol agent would provide another critical tool for managing this invasive plant and making your efforts more sustainable.

As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

MALAMA O PUNA

P. O. Box 1520

Pahoa, HI 96778

(808) 965-2000

www.malamaopuna.org ~ malamaopuna@yahoo.com

Preserving Hawai'i's precious natural heritage

Dr. Neil Reimer
Hawai'i State Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

July 16, 2010

Aloha Dr. Reimer,

We respectfully submit our comments on "Draft Environmental Assessment-- Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands" for Malama O Puna, environmental 501(c)(3) nonprofit with a mission to protect Hawai'i's precious natural heritage.

For problems of invasive species that are too numerous and widespread for an effective control campaign using pesticides or manual removal, biological control is really the only feasible approach. First, biocontrol saves on chemical use. Second, it is self-replicating and self-dispersing, doing most of the work for us. Third, it introduces an element of balance to the system: many of Hawai'i's most monstrous invasive species are uncommon or even endangered in their homelands: *Rauvolfia vomitoria*, weed from hell in Kohala, is endangered in Africa, and *Psidium cattelianum*, waiawi, is not crowding out every other plant in Brazil, like it does in Hawai'i. These plants are therefore not inherently invasive and are probably so aggressive here in part because their natural biological controls did not come with them. It is reasonable, actually, wise, to bring those controls here when they are tightly co-evolved with the target pest, feeding on nothing else.

We cherish the 'ohi'a. We do not think that the risk of a switch in host specificity of the waiawi scale insect to 'ohi'a or any other native plant is likely, whereas we already know that the risk to 'ohi'a from the continued spread of waiawi is enormous. 'Ohi'a trees in Puna forests such as Wao Kele O Puna, Malama Ki, Haleupa'a, and Keauohana are dropping like flies due to the encroachment by waiawi. The 'ohi'a and hundreds of other plant species, as well as the native birds, insects, fungi, spiders, etc, that depend on them, are all in jeopardy. The encroachment is happening so fast it is scary. The other day we had difficulty walking through a forest because it was thickly invaded by waiawi saplings. This same forest was open and inviting and mostly intact native forest just 7 years ago, at a time when we were already anticipating the release of this biocontrol agent for waiawi. This is an experience that we have often, and it is heartbreaking.

As noted in the EA, the species specificity of the scale insect-waiawi symbiosis makes the scale an excellent candidate for a safe biological control agent. The scale attaches itself to the leaf of the host plant, which creates a specific cellular interaction between the two species resulting in the insect being enveloped by the leaf tissue in a gall. This intimate biological interaction, the result of many thousands of years of co-evolution, makes a switch in host-specificity not impossible, but extremely unlikely.

Rigorous testing confirms this insect's candidacy for safe biological control agent:

We feel that the 15 years of careful research, including thorough testing of the scale on over 80 native and cultural plant species, gives us adequate security in releasing this scale insect. Biocontrol has proven to be highly effective and safe in the 35 years since testing and regulation went into effect, and in that time 51+ biocontrol agents have been safely introduced into Hawai‘i, many with profound positive effects.

One important point made in the EA about habitat loss due to waiawi is that the majority of our endangered and threatened plants are within the area that is either already invaded by waiawi or within this weed’s potential range. This makes it critical that we act without further delay to save these imperiled species that exist nowhere else.

The argument that we should not introduce any more species, including ones that are thoroughly tested for specificity as biocontrol agents, is untenable given that we allow imports of many potentially invasive species every year due to inadequate inspections and regulations of incoming cargo.

Let’s not miss out on this opportunity to slow the destruction of our native forests. Let’s reap the benefits of the large investment of effort and resources that has already been made toward assuring us that this biocontrol agent is safe, effective and highly worthy of release. Our forests have never been adequately cared for, but especially in these days of budgetary reductions the resources available for managing weeds by manual means are very limited relative to the *scale* of the problem, and this is especially true for waiawi because the area is vast and the density daunting. Biocontrol is the only reasonable approach, and this particular biocontrol release is long overdue.

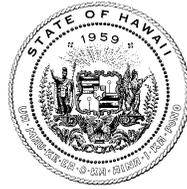
Australia (birthplace of permaculture) and New Zealand have recently taken the lead in protecting their ecosystems by greatly restricting what comes in and by prioritizing research in biological controls to deal with established pests. I suggest we follow that lead. Permaculture utilizes biological resources in an attempt to achieve a self-regulating system. This is exactly what biocontrol does. One thing I know Australia, New Zealand and Hawai‘i have in common is that we all have extensive natural treasures to protect.

Given Malama O Puna’s mission of protecting Hawai‘i’s precious natural heritage, we would be remiss if we did not support this opportunity to slow the destruction of our native ecosystems. We are already volunteering in our public forests to limit the destruction caused by aggressive weeds, and will continue to do so. When combined with biocontrol, efforts of groups like ours can make a significant difference in protecting the diversity of life forms that we hold dear. We believe that the EA has more than adequately addressed the concerns that have been raised about the release, and we do not agree with those who maintain that an EIS should now be done. Time is of the essence and the call for an EIS is nothing more than a delaying tactic rather than a genuine desire for more information.

I urge you to approve release of *Tectococcus ovatus*, biocontrol agent for waiawi, as soon as possible.

Mahalo nui loa,
Ann Kobsa, Ph.D., Biologist
Vice-President and Invasive Species Coordinator
Malama O Puna
PO Box 1520
Pahoa, HI 96778
ann.kobsa@gmail.com
copy to: Mr. Paul Conry DOFAW/DLNR (by email)

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ann Kobsa, Ph.D.
Vice-President and Invasive Species Coordinator
Malama O Puna
Box 1520
Pahoa, HI 96778

Dear Dr. Kobsa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 16, 2010, on the Draft EA, indicating Malama O Puna's support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Gregory A. Koob
1818 Manaiki Place
Honolulu, HI 96819

July 22, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawaii's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is necessary to protect Hawaii's native forests.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae ranges. I have been in dark thickets of strawberry guava covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27 to 50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

Oahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*Acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that 'ōhia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ōhi'a and koa are not easily seen. To find them and there associate requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe fro this invasive species. Strawberry guava trees grow at the summits of both ranges and are spreading. Releasing *Tectococcus ovatus* will slow that spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers,

opening up pastures on the Big Island and making them usable again. When Hawaii's native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the erythrina gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

Tectococcus ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai'i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give 'ōhi'a and koa seeds a chance to sprout.

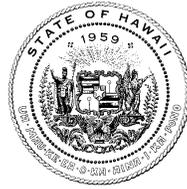
Like Hawaii's language and culture, Hawaii's forests are unique, most of the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava's natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,

A handwritten signature in cursive script that reads "Gregory A. Koob".

Gregory A. Koob

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Gregory Koob
1818 Manaiki Pl.
Honolulu, HI 96819

Dear Mr. Koob:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To Hawaii Department of Agriculture,

I support the planned release of the biocontrol agent for strawberry guava. Strawberry guava is a very invasive plant that threatens native forests, watersheds and agriculture by serving as a source pool for pest fruit flies. Biocontrol is the only viable method for slowing the spread of strawberry guava, and I am convinced that the state and federal agencies have conducted the necessary background research to ensure that this agent will not be an environmental threat when released.

Paul Krushelnycky
Department of Plant and Environmental Protection Sciences
University of H

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Paul Krushelnycky
Department of Plant and Environmental Protection Sciences
University of Hawai'i

Dear Dr. Krushelnycky:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I would like to register my firm support for the introduction of *Tectococcus ovatus* to control the spread of strawberry guava (waiawī and waiawī 'ula'ula), especially in our native forests.

As a young Native Hawaiian and a cultural practitioner, I grew up hiking and gathering in areas that were dominated by waiawī at lower elevations. Over the years, I have watched those patches of waiawī expand and crowd out more native species. This has a direct impact upon the resources that are available to me and my community and the survival of my culture. The introduction of *T. ovatus* is the beginning of what I hope to be a more effective and concerted effort to eradicate waiawī in our native uplands.

The waiawī's only unique and redeeming quality is its fruit, and those fruit are not worth the price we pay in allowing this scourge to continue unchecked in our forests. For any other purpose, waiawī is NOT uniquely qualified and it is far preferable to me to utilize native hardwoods. There is really no reason to be concerned for the survival of waiawī in Hawai'i.

Furthermore, although not an expected outcome, I support any reduction in the feral pig population that could result from a reduced waiawī population. I am not a hunter, but I do realize that a number of our local and Hawaiian families supplement their diets with feral game. This is a more recent cultural practice that cannot come at the expense of native ecosystems. I hope that some day feral game will be fenced in (allowing for continued hunting), as opposed to the free range they are currently afforded.

As the Kumulipo (a cosmogonic genealogy) so beautifully expresses, all things are connected. So a healthy upland will contribute to a healthy ocean. Stemming the spread of waiawī and supporting healthy native forest growth will have results that reverberate positively throughout our archipelago. Although we often fail to recognize the importance of the native forests, our wealth and livelihoods are dependent upon them.

Finally, I am NOT concerned that *T. ovatus* is an alien introduction into our native forest habitat. Accidental alien introductions occur all the time and the primary reason these introductions are disconcerting is because these alien species often go unchecked by natural predators and have a negative impact on the native flora and fauna. The introduction of *T. ovatus* is a direct and potentially effective response to help mitigate the spread of an alien introduction that has a proven negative impact on our 'āina (land; source of sustenance).

I also trust in the scientific processes that went into certifying that *T. ovatus* will not have a negative impact on our native flora and fauna. Biocontrols have a checkered history in Hawai'i, namely due to some disastrous introductions (e.g. mongooses and carnivorous snails) many years ago. However, the level of scientific and social scrutiny that is employed in our contemporary practice of biocontrol introduction makes this a very different process; so much so that the mongoose and other disastrous introductions should not be associated with biocontrols in the least.

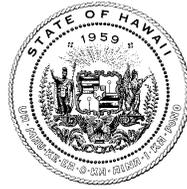
The decision to introduce *T. ovatus* into our native forests is a permanent one - it is final. Maybe it's that finality that makes some folks nervous. However, the introduction of *T. ovatus* is far preferable to watching our native forests slowly crowded out by strawberry guava and the innumerable negative repercussions of that environmental disaster. Introducing *Tectococcus ovatus* is currently our only option, and it is the BEST option for us now and into the foreseeable future.

Mahalo for this opportunity to register my opinion on this very important issue.

Me ka 'oia'i'o,
Keoni Kuoha

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Keoni Kuoha

Dear Mr. Kuoha:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

rlauhaiku@gmail.com

To Those Involved in The Strawberry Guava Control Controversy;

I have been involved with the environment a good part of my adult life as an educator, volunteer, and advisor to environmental groups at the high school level. I have now been retired for 11 yrs. but still volunteer to rid our 20% of remaining native rainforest of alien species. Among the most devastating alien plants is the strawberry guava infestation. I don't believe we have the luxury of time before we do something as it will be too late as we have been too late too many times in the past to prevent alien species from destroying our irreplaceable native forest. We need to use biological controls as this is the best way to control the infestation unless someone has a better idea.

Respectfully Submitted:

Ronald Lau
Rebecca Lau
Haiku, Hi

+++++

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Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ronald Lau
Rebecca Lau
Haiku, HI

Dear Rebecca and Ronald:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Date:
June 17, 2010

To:
Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

From:
James Leary, PhD
Assistant Specialist for Invasive Weed Management
College of Tropical Agriculture & Human Resources, University of Hawaii at Manoa
PO Box 269 Kula, HI 96790 USA

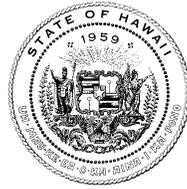
Subject:

Technical review and opinion regarding the Environmental assessment prepared by the Hawaii Department of Land and Natural Resources titled "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands"

I serve as an assistant specialist in invasive weed management for the University of Hawaii Cooperative Extension Service and have over 10 years of academic and professional experience in weed management in Hawaii. I have reviewed the environmental assessment prepared by the Hawaii Department of Land and Natural Resources titled "Biocontrol of Strawberry Guava (*Psidium cattelianum*) by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands" and conclude with confidence that the scientific methods to assess host specificity were appropriate, thorough and provide strong indication that collateral non-target impacts are highly unlikely if this agent is to be released into the environment. If *Tectococcus ovatus* proves to be an effective agent in suppressing resident strawberry guava infestations, this could be a boon to watershed restoration as a whole. Currently, natural habitat management operations are dominated by weed control activities and any opportunity to reallocate taxpayer funds into other utilities, such as active restoration outplanting, will be a great service to the conservation agenda.

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Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

James Leary, Ph.D.
Assistant Specialist for Invasive Weed Management
College of Tropical Agriculture & Human Resources
University of Hawai'i at Manoa
P.O. Box 269 Kula, HI 96790

Dear Dr. Leary:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 17, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 23, 2010

Hawaii Department of Agriculture

Plant Pest control Branch

1428 South King St.

Honolulu, HI 96814

RE: Support of 2010 06-23 ST-DEA-Biocontrol Strawberry Guava

To whom it may concern;

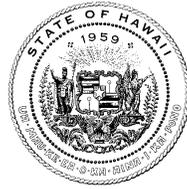
I am in full support to release the bio-control agent *T. ovatus* against Strawberry guava. Hawaii Forest ecosystems has reached a tipping point where options to control or slow the growth of this species into sensitive native forest has failed. Mechanical means are proven to be extremely costly and long term funding is tenuous at best. Multiple efforts are needed to attack this aggressively growing species. Utilizing all efforts including using bio-control efforts is needed as part of the long-term goal to slow the spread of strawberry guava into native forest ecosystems.

Julie Leialoha

P.O. Box 1792

Kea'au, HI 96749

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Julie Leialoha
P.O. Box 1792
Kea'au, HI 96749

Dear Ms. Leialoha:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts, including yours on behalf of native species and ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

David Leonard
dleonard@gru.net
Honolulu, HI

July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is necessary to protect Hawai'i's native forests.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava covering acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

O'ahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that 'ōhia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ōhi'a and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava to the tops of ridges. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawai'i's native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai‘i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give ‘ōhi‘a and koa seeds a chance to sprout.

Like Hawai‘i’s language and culture, Hawai‘i’s forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava’s natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,
David Leonard

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David Leonard

Dear Mr. Leonard:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

My name is Catherine Leong and I support the release of the strawberry guava biocontrol and I understand it will help slow the spread of this invasive weed into our native forests.

It is well known that sacrifices must be made in every part of daily life - for each positive there is some sort of negative. I feel the negative effects of the strawberry guava in our native forests far out way other the negative effects of not doing anything. The crowding out and taking over habitat for native plants and animals in our native forests and the threatening of cultural resources cannot be returned once they are lost.

The argument for feral pigs requiring this fruit for their meals does not fly because they have a diverse diet that relays on a wide variety of forest foods other than strawberry guava.

Do we have an option with current chemicals and manpower - no. Will we in the future - not likely. And if so, by then the strawberry guava will have multiplied beyond control (just as the coqui frog is now out of control on Hawaii island and has now been deemed too expensive for eradication. Shall we let this happen to our forests?

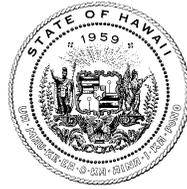
Would you rather slow the rate of growth for strawberry guava or have it take over the forests and lose them. Which is more important. You will still be able to get strawberry guava but you will never be able to re-build our native forests.

Thank you.

Catherine Leong
64-712 Aoloa St, Kamuela, HI 96743
808-885-5270

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Catherine Leong
64-712 Aoloa St
Kamuela, HI 96743

Dear Ms. Leong:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

7/12/10

Re: Biocontrol of
Strawberry Guava by its
Natural Control Agent..etc.

I support this project.
Problem is great and
growing. Control agent
has been adequately
tested.

Ruth Levin

Ruth Levin
P.O. Box 1118
Volcano, HI 96785



Ruth Levin
P.O. Box 1118
Volcano, HI 96785-1118

HONOLULU HI 968

14 JUL 2010 PM 2 T



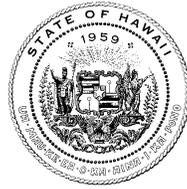
Hawaii State Dept Agriculture
Plant Pest Control
1428 S. King Street
Honolulu, HI 96814

96814+96812



Neil Reimer

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ruth Levin
P.O. Box 1118
Volcano, HI 96785

Dear Ms. Levin:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 12, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Gentlemen/Ma'am:

Please take the planned steps to control the waiwi (strawberry guava). As both a Big Island resident and a commercial fruit grower, I am alarmed at the negative environmental and business costs that will continue to mount if this pest is not controlled. I spend backbreaking hours removing waiwi from my orchard. It is resistant to standard applications of glyphosphate herbicide and, frankly, I am not going to introduce strong herbicides into my orchard environment. Consequently, I waste large time and energy resources physically removing this pest. Ultimately, that impacts my bottom line.

As a resident who understands the multiple threats our diminished native ecosystems face, I know waiwi needs control NOW. Yesterday, I visited Hawaii Volcanoes National Park and was mortified to see the continued aggressive inroads this plant is making into the forest. PLEASE, if you don't control it, we may lose what we have left of our native forests.

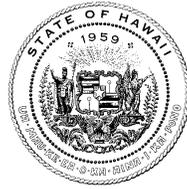
I do understand the concerns that the control organism could attack desirable plants. But I think most advancement in life involves risk assessment and rational plans of action. If nothing is done, we may almost certainly lose our last lower elevation, premontane, and montane rainforests. I believe the near certainty of that risk far outweighs the concern over possible attack of other plants/animals by the control organism. And for those who want to grow waiwi, I believe that it will successfully grow and fruit in the home environment with proper application of organic and other non-systemic controls that are used in many commercial orchards as well.

Mahalo for your efforts!

David Longacre
P.O. Box 179
Hakalau, HI 96710
ph: 808-345-5290

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

David Longacre
P.O. Box 179
Hakalau, HI 96710

Dear Mr. Longacre:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 6, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the kind of hard work you have done removing strawberry guava, the proposed biocontrol agent would provide another critical tool for managing this invasive plant and make your efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

21 July 2010

To:
Hawaii Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Subject: Support of the proposed release of the scale insect, *Tectococcus ovatus*, for biological control of strawberry guava

I've reviewed the environmental assessment for release of *Tectococcus ovatus*, "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands", and I strongly support the release of the carefully chosen and tested scale insect from the native range of strawberry guava in Brazil. Survival of ohia and other endemic Hawaiian plant and animal species is enormously important to me. Symbolically important for me is that my 11-month-old granddaughter, 30% Hawaiian, is named Ohia, and I want her to have more than just a few namesake plants in remote forests when she gets old. Ohia has been the dominant plant species in our islands for millions of years, and strawberry guava is posing a major threat toward eventually displacing it entirely.

As the grandfather of Ohia, I resent the fact that opponents of the release have used the false argument that the biocontrol agent has a likelihood of attacking ohia trees. Concern that with release of *Tectococcus*, strawberry guava trees will look ugly, not produce such abundant fruit, and not help maximize feral pig populations seems quite valid. In today's world, it is difficult to satisfy all concerns. So let's try to clarify what concerns are legitimate.

This letter comes from me as a private citizen and the grandfather of baby Ohia. But I have a professional life as a conservation biologist that is relevant. I regard strawberry guava as perhaps having done more destruction to endemic forest species in the state of Hawaii over the past century than any other invasive plant. We on Maui are so committed to stopping the as yet very limited invasion of *Miconia calvescens*. We recognize, however, that strawberry guava has very similar impacts to miconia but is far beyond mechanical and chemical control and is much more widespread than miconia and still spreading. Removal of feral pigs in Haleakala National Park's Kipahulu Valley 20 years ago has slowed but not stopped the invasion of strawberry guava into the valley because birds can spread its seeds. Art Medeiros' Ph.D. thesis provides good documentation for that. Strawberry guava's ability to germinate and thrive in the shade places it in a small group of the most devastatingly invasive species in Hawaii's forests as does its ability to spread to relatively high elevations. It sounds as if this agent may slow the growth and fruiting of its target, perhaps enough to retard further spread.

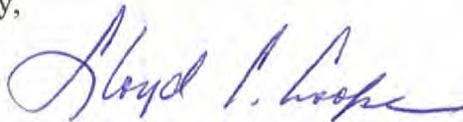
I believe that it is very important to get this agent released in a reasonably timely manner, given that host testing has indicated absence of significant risk to other species, even to common guava.

My view is that the real threat to the dominant plant species of Hawaii is the pests of under-regulated globalization, much as we've recently learned for ohia (with the pathogen *Puccinia psidii*) and for wiliwili (with the notorious gall wasp). So called "plant protection" standards for agricultural quarantine generally tend to favor trade to an extreme, in my view, though Hawaii has the right to protect its ohia and other native species. It is ironic that some opponents of the release have argued that the *Tectococcus* is a threat to ohia, and they've used the case of the rust *Puccinia psidii* as an example to support their anti-biocontrol views. This is nonsense. I'm pretty sure that I know more about this rust than just about anyone in Hawaii. Please see the URL, <http://pubs.usgs.gov/of/2010/1082/>.

In my view, the pathogens likely to be brought to Hawaii by globalization of trade are at least two orders of magnitude more of a threat to ohia than this biocontrol release. And strawberry guava itself is arguably a roughly equal threat to ohia over the long term as new strains of the rust *Puccinia psidii* can be brought by globalization of trade. I think Hawaii is likely to take major steps soon to protect ohia from *P. psidii*. I just hope that Hawaii takes similarly protective measures by moving ahead with the *Tectococcus* release.

I fully support the actions proposed in the environmental assessment.

Sincerely,

A handwritten signature in blue ink that reads "Lloyd L. Loope". The signature is written in a cursive, flowing style.

Lloyd L. Loope, Ph.D.
751 Pelenaka Place, Makawao, HI 96768

Cc: Hawai'i State DLNR, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325
Honolulu, HI 96813

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Lloyd Loope, Ph.D.
751 Pelenaka Pl.
Makawao, HI 96768

Dear Dr. Loope:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. The threats posed by strawberry guava are indeed real and comparable to our very worst ecosystem-transforming invaders. Thank you for sharing your knowledge of the *Puccinia* rust with the citizens of Hawai'i.

We agree that biological control and improved quarantine measures both have crucial roles to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Hawaii Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

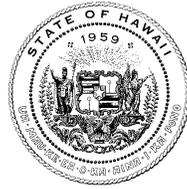
To whom it may concern:

I am writing in favor of the strawberry guava bio-control release. As a graduate with a degree in Biology with emphasis in conservation and an avid hiker in the West Maui I have seen firsthand what strawberry guava does and can do to the native Hawaiian forest. I have seen beautiful native plants being aggressively outcompeted by guava and I believe that a natural predator of strawberry guava would slow this aggressive competition interaction that is occurring in Hawaii. Having a diverse forest is a necessity in order to have a healthy ecosystem and strawberry guava prevents diversity by creating monotypic stands. Also having a diverse rain forest is essential in water conservation. I hope that the bio-control release program continues for the sake of the people of Hawaii and Hawaii itself.

Sincerely,

Vanessa Lopez
vaneslopez@gmail.com
Maui resident

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Vanessa Lopez

Dear Ms. Lopez:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

MATTHEW D. LUERA
P.O. Box 778
VOLCANO, HI 96785
808-967-7697
Fax: 808-985-7099

July 7, 2010

Hawaii Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

To Whom It May Concern,

RE: Strawberry Guava Eradication

I have lived in the lower Volcano area on the Big Island for over 30 years and have spent half of those years combating the strawberry guava infestation.

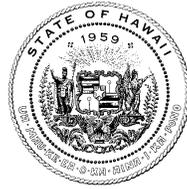
I own 6.3 acres adjoining the state conservation land (Kahaulea). When we first moved up to this area in 1980, there were very few guava trees in the forest surrounding our property. I remember talking to a coworker that had a 3 acre lot in lower Fern Forest (Glenwood). He said he was battling the guavas at his place and they were taking over his property. He warned me that they were marching up the hill towards my place. I had to laugh trying to envision a tree taking over my property. Well, he was right. I have been actively pulling and poisoning the guava for the last 15 years. With the help of my Dad, we cleaned the front of the property and I have continued cleaning and poisoning in the back areas. However, I fear it is a futile attempt when we are surrounded by this scourge. I fully support the bio-control that is being proposed. Doing nothing is NOT an option if we hope to save the remaining forests. Anyone that is proposing to eradicate guava with manpower alone is not being realistic. All they have to do is go to Glenwood and walk in the forest there to get a glimpse into the future of our native forests if nothing is done.

I have seen first-hand what can happen in 30 years, and in another 60 years, the native forests will be just a memory.

Sincerely,

Matthew D. Luera

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mathew Luera
P.O. Box 778,
Volcano, HI 96785

Dear Mr. Luera:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 7, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dear Sirs:

Please support efforts to control the invasive strawberry guava by using its native control insect. Strawberry guava negatively impacts our native forests by crowding out and taking over habitat for native plants and animals. It also threatens local agriculture by supporting a large reservoir of fruit flies which damage produce and export potential.

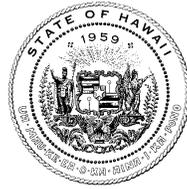
The current control options (chemical and mechanical control) are limited and unable to address the magnitude of the problem and rate of spread. Using the native control insect should be better on all accounts. The biology of the Brazilian scale insect and results of 10+ years of host specificity studies show that this insect is a good, safe option for the sustainable, long-term management of strawberry guava. It won't harm our native species. 15 years of testing has shown that the bug will ONLY survive on strawberry guava; not on 'ohi'a, not on koa, not even on other species of guava.

Please take positive action now! The "No Action Alternative" will allow strawberry guava to continue to spread through Hawai'i's watersheds, native forests, and habitats for native plants and animals.

Thank you for considering my input in this matter.
Kathleen Luiten

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Kathleen Luiten

Dear Ms. Luiten:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I am sorry I missed the opportunity to comment on this project. I was out of town -- on Hawai'i, eradicating guava, in fact, from my lot near Volcano, in accord with my Native Forest Dedication management plan.

I offered my 3-acre lot as an experimental area, when speaking to one of the project coordinators at your information meeting at McCoy Pavillion last year. Please keep me on your notification list.

Mahalo,
Kay Lynch

SUBSEQUENT COMMENT

Aloha, Betsy,

Would you please forward this msg to the appropriate DOA office? The address given in the newspaper (doa.ppc@hawaii.gov) is not working. I tried several variants and they didn't work, either. I know Friday is the deadline.

Mahalo, and hope you are OK.

Kay

Dear guardians of the Hawaiian forest:

As a volunteer with groups working to protect and repair native Hawaiian species habitat, I have seen what strawberry guava is doing to our native forests and how hard it is to control. I wholeheartedly support the Department of Agriculture's proposal to introduce a scale insect for strawberry guava biocontrol. I attended the information meeting at McCoy Pavilion and have partially read the environmental assessment. I am horrified by the maps showing the expected further spread of *Psidium cattleianum*. And I am dismayed by the statement on Page 36 of the EA that the success of the biocontrol project may be limited. However, we must try. Guava is abundant in many tropical places, while remaining Hawaiian forest and the species it protects are an irreplaceable legacy we cannot let slip away. As the operator of a nursery devoted to Hawaiian fern propagation research, I am especially concerned about the damage guava is doing to fern habitat.

I wish the U.S. Forest Service, or another agency, could repeat its excellent information poster sessions, such as the one I attended at McCoy Pavilion. The available science could lay to rest the fears of many about strawberry guava biocontrol, if they just had more access to it. As to the fruit as a delicacy: A scientist friend from Sao Paulo told me

that even though there are naturally occurring biocontrols in Brazil, people still love their strawberry guava and find plenty of fruit to enjoy.

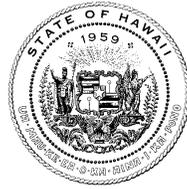
Other notes:

== I have a lot at the 3000-foot elevation near Volcano. It is has the county protective designation "Native Forest" and I intend to restore the native fern diversity there. Last week I spent two days removing strawberry guava whips and seedlings from one of the richest parts of this 3-acre lot. If there is any interest, I would be pleased to have my private land included in the biocontrol experiment. == On Page 9 of the EA, the nonword "horticulturalists" appears. That's like saying "dentallists" (as in, "I went to my dentist to have my teeth cleaned"). It should be horticulturists. Mahalo.

Kay Lynch
La'au Hawai'i and The Hawaiian Fern Project

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Kay Lynch
La'au Hawai'i and The Hawaiian Fern Project

Dear Ms. Lynch:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 25, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your efforts on behalf of native species in Hawai'i are appreciated. Although it will not replace the kind of hard work you have done removing strawberry guava, the proposed biocontrol agent would provide another critical tool for managing this invasive plant and make your efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Anders Lyons
449 Kealaloa Avenue, Makawao, Hawaii 96768

Hawaii State Department of Agriculture
Pest Control Branch
1428 S. King St.
Honolulu, HI 96814
Attn: Dr. Neil Reimer

July 22, 2010

Re: Strong support for the release of the biocontrol *Tectococcus ovatus* to control Strawberry Guava.

Dear Dr. Reimer,

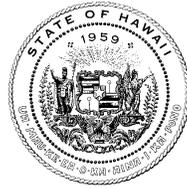
I strongly support the release of *Tectococcus ovatus* to control the habitat modifying weed Strawberry Guava. The toll of this one species on native ecosystems, ground and surface water, and water quality cannot be overstated and it is high time that an effective biocontrol be released statewide. I urge you to move as swiftly as the law allows to release *Tectococcus ovatus* so our native ecosystems can begin their recovery. Thank you for your hard work on this important issue.

Should you have any questions I can be reached at (808) 463-4192 or andersaffald@hotmail.com.

Aloha


Anders Lyons

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Anders Lyons
449 Kealaloa Ave.
Makawao, HI 96768

Dear Mr. Lyons:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To Whom it May Concern,

I am supportive of the proposal to manage strawberry guava with the Brazilian scale insect. The positive impacts of this project include the protection of native forest species, the ability of the forest to produce water, and the reduction of fruit flies. These impacts will result in both an economic and ecological benefit to the state. Although there are risks involved with the introduction of any new insect, the rigorous testing done by researchers satisfies my concerns with respect to this insect's potential to cause unwanted harm.

Sincerely,
Peggy Martin

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Peggy Martin

Dear Ms. Martin:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



July 22, 2010

Hawaii Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

RE: Testimony in support of proposed field release of *Tectococcus ovatus*,
Psidium cattleianum biological control

To whom it may concern:

I realize the concern over introducing a new species into our fragile ecosystems here in Hawaii; however I would like express my strong support for the release of the *Tectococcus ovatus* biological control. Very large tracts of native forested lands (including areas all the way to the summit areas) of both the East and West Maui Watersheds are susceptible to severe infestations of Strawberry Guava if allowed to persist.

If you've ever had to cut down a Strawberry Guava tree you would know that they are very hard to kill. New shoots come up from the stump and if you pull the tree by the roots and leave the tree on the ground (uprooted) it will still grow. Currently our only means of treating this extremely invasive species are with ground crews and herbicide, a costly, and time consuming methodology. Coupled with the extreme terrain and weather conditions that we have here on Maui, eradicating even a small patch of *Psidium* is a difficult task.

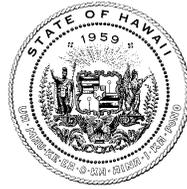
With the introduction of this biocontrol, ground crews will be given a helping hand in the fight against this super invasive pest. I would hope that after years of natural resource protection in Hawaii that the real argument is not whether or not Strawberry Guava should be killed, but rather is biocontrol the safe and effective methodology? And I am saying yes, please help fellow natural resource managers stop this pest from taking over literally the entirety of our native forested watersheds. If Strawberry Guava is left unchecked and it spreads to large areas we could see significant decreases in water availability from our aquifers, not to mention large declines in the variety and health of native forest birds, insects and other native plants, some found nowhere else on the planet!

Strawberry Guava is one of the hardiest and most determined of our invasive plants in Hawaii. The DOA has done a great job over the last decades to introduce other successful biocontrols that have not caused problems with other species. It's been a long time since the mongoose, and I am confident in our ability to study these species carefully. But more importantly I am also confident that without the help of this biocontrol we will just continue to be spending tax-payers money fighting a losing battle against this species by hand because conservationists and resource managers are not willing to let this plant thrive.

Thank you for your consideration!

Sarah E McLane
Founder/Consultant
The Makali'i Group

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sarah McLane

Dear Ms. McLane:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

"Arthur Medeiros" <artcmedeiros@gmail.com>

7/23/2010

I am writing to ask your support in favor of the introduction into Hawai'i of strawberry guava biological control by the U.S. Forest Service.

Let me introduce myself. I am a local boy who earned my Ph.D. at the University of Hawai'i at Manoa. My dissertation addressed the most invasive rain forest weeds of Hawai'i, with a large part of the dissertation research addressing the ecology and threat posed by strawberry guava to Hawaiian forests. I have worked for over 25 years here on Maui as a biologist on the natural history and conservation of Hawaiian forests.

To me, there may be no more important decision we may have to make as a community regarding the fate of native Hawaiian watershed forests than the one before us. Hawaiian forests provide us the water that comes out of our faucets, as well as homes for Hawaiian plants and animals that have nowhere else to go. They cannot be kept in botanical gardens and zoos forever, some that have existed in their native forests for millions of years wither in captivity within days. To the Hawaiians these plants and animals are not just unique, but embodiments of forces and deities of ancient Hawai'i, embedded in the chants, legends, and *hula* of the islands. Nearly every aspect of the native Hawaiian culture has loci and connection with terrestrial plants and animals. These are sacred, the scholar Nathaniel Emerson writing in the *Unwritten Literature of the Hula* (1909) stated the *hula* plants were the "favorite manifestations" of the gods. If we try our best

and still lose them, then *auwe*, but at least we tried our best. To not defend them at this crucial hour, but instead, as a modern Hawaiian society, to defend the “rights” of a Brazilian tree in our Hawaiian homelands seems to me misguided in the most obtuse of ways. To biologists, each of the islands harbor forests that are without parallel in the Pacific or for that matter, anywhere else on our planet.

These forests are threatened with complete replacement by about a dozen weed species, most from Central and South America, of which strawberry guava, like Miconia, is among the worst. If we vote no at this critical juncture, I as a resident of Hawai'i and lifelong land manager and researcher know there will be no stopping these weeds.

Food is a necessary resource, but in this case it must also be balanced against the fresh water received from healthy watershed forests and with this fresh water, the agricultural production that they can provide for. Some people say “Why don't we just cut them down?”, but they don't realize the extent of the problem. These trees are extremely difficult to kill, constantly resprouting, sometimes years afterward. And remember, there are millions, likely billions, of trees many of them growing in extremely rugged and remote areas. It is likely even if we dedicated the entire state budget, it would likely not be sufficient to accomplish this task. Even if was feasible, just imagine the amount of herbicide that would be poured into the watershed-this is an unacceptable solution.

Though I prefer common guava (unaffected by strawberry guava biological control), I do enjoy the taste of strawberry guava fruit, but if that is the reason we choose to unravel native Hawaiian forests, the birds and other creatures that depend on them, then I believe the short-term gains cannot possibly compensate the costs. I don't believe the detractors are bad people, I spoke at the public meeting in Hilo, and chatted with many of them. They seemed sincere, but sadly misguided. And gosh, I wish I could have taken them to forests I know where literally millions of strawberry guava are choking the last big *koa* of Maui island, seemingly without an end in sight. Just *koa* itself represents not only a critical cultural species, essential for canoes, but also the basis of a 30 million dollar annual input into the state's economy. I had the privilege in paddling in the state

championships for the HCRA where a *koa* canoe is mandatory. I cannot describe the vision of 20 or so gleaming boats lined up waiting for the start. Many clubs do not have a *koa* boat, and must borrow one to race, and have not hope of obtaining one because big *koa* trees are so rare. Until a few months ago, all the canoe clubs of the entire island of Moloka'i did not have a single *koa wa'a* (canoe). Through Kimokea Kapahulehua and Malama Chun, I was asked to help obtain a *koa* log for Moloka'i from Maui, but we had none big enough to give. Eventually a large enough log was obtained from Hawai'i Island. If we don't slow down strawberry guava, the *koa* resource currently found in the islands will be depleted to the point that racing in a *koa* boat will become a "remember when" story.

Biological control has been honed and developed into a careful science. It is used around the world for otherwise intractable problem species, when nothing else is working and the toll of failure just too much to bear. Much of the bad public relations of biological control is now over a century old.

I know to most people the idea of deliberately introducing something from another land is foreign and invokes a sense of danger. It's unfortunate that the people who introduced these pests to Hawai'i did not undergo the same degree of scrutiny. Three years ago I visited Brazil, saw strawberry guava in its native homeland, and consulted with the Brazilian scientists and students that have invested their whole lives in making sure that the biocontrol insects will attack only strawberry guava, not common guava nor any other plant in Hawai'i, whether native or of commercial value.

Here's another important point: If we introduced this and the other essential insects intended for biocontrol of strawberry guava, the plant will not be eliminated. Introduction of biological control simply slows down this pest, it levels the playing field, making native plants able to compete and survive. In its native home, where all the insects intended for biological control are common, strawberry guava is still prevalent and available as a food resource. Whether you like it or not, strawberry guava is going to be with us in the future in Hawai'i,

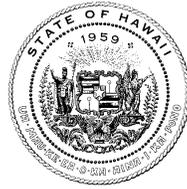
there will be plenty of strawberry guava fruit, it will just stop being the superinvader of Hawaiian forests

These efforts are not the result of last minute thrown-together ideas, but the culmination of a several decade-long process to develop a more timely, cost-effective and comprehensive approach to our battle with invasive species. A battle I'll add that we likely will lose without this type of assistance because, speaking frankly, there are so few tools available to us.

I know Tracy and the other scientists associated with these efforts. I can assure you they have no axe to grind. They do not get paid by the insect. They have devoted their whole lives as public servants to defend our watershed forests. If we decide as a modern Hawaiian community we want to stop this effort, we can make it so. But with that decision, this generation will have sealed the fate of Hawaiian forests, the *wao akua*, which have existed for millions of years before the tenure of our stewardship. As a citizen of the State of Hawai'i, as a lover of the Hawaiian culture and our plants and animals, and as a biologist who has given my entire life to the cause of understanding and protecting these things, I humbly ask your help in supporting this effort to save our Hawaiian watershed forests.

Respectfully, Art Medeiros

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Art Medeiros

Dear Dr. Medeiros:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique native forests, the fresh water they provide, and the Hawaiian culture they have nourished for centuries. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

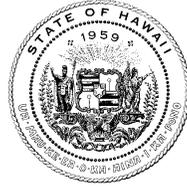
To Whom it May Concern:

I support efforts to control the invasive strawberry guava by its natural control insect. Strawberry guava impacts native forests by crowding out and taking over habitat for native plants and animals. The “No Action Alternative” will allow strawberry guava to continue to spread through Hawai’i’s watersheds, native forests, and habitats for native plants and animals, and I hope that does not happen. Thank you very much.

Sincerely,
Dr. Matthew Medeiros

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Dr. Matthew Medeiros

Dear Dr. Medeiros:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I strongly support the release of scale insect, *Tectococcus ovatus* to control the introduced, invasive strawberry guava.

Having hiked the forest trails in Hawaii for over 34 years I can attest to the invasiveness of strawberry guava. Trails that once had a few of these trees are now totally overrun by this pest. The resulting monoculture has destroyed the native forest that once existed in these areas. I have seen how the areas that once held healthy native forests have become less able to absorb rainfall as the strawberry guava shaded out the understory plants. I have also seen areas that have Hawaiian archaeological sites such as walls and burial grounds have been engulfed by the relentless onslaught of the strawberry guava. Not only does the strawberry guava damage these sites, but it also pushes out many of the plants and animals used in the Hawaiian culture.

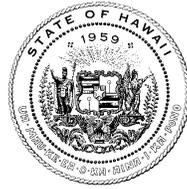
Considering the extent of the spread of strawberry guava, there is no method of control that is feasible economically or logistically. Biological control methods have been used to successfully control a number of pests, both animal and plant, in Hawaii. Remember the invasion of the spiraling whitefly back in the 80's? It was controlled by another insect. Most people don't realize that insects and disease organisms have been used to control plants as well. The invasive *Clidemia hirta* (Coster's curse) has been limited in its spread by both a small insect and a fungal organism. They haven't totally eliminated the pest, but reduce its rapid spread so that the native forest plants can compete. Numerous examples can be given of how HDOA has made great strides in controlling a number of terrible pests using biological control methods. In each case the organisms released have been extensively tested and shown to be safe for the environment.

There is a very small vocal minority of people that oppose the release of the *Tectococcus ovatus*. I too like the small fruit of the strawberry guava, but it is unlikely that the *Tectococcus ovatus* will totally wipe out the trees, and I would rather forego eating strawberry guava than see the incalculable damage it does. There are some that complain that releasing *Tectococcus ovatus* will infringe on their private property rights. This is a spurious argument. Could I establish a reserve for free-range rats and cockroaches on my property? I doubt if my neighbors, the Board of Health and other officials would approve. In fact I might have to pay for the removal of such pests. Although strawberry guava does not endanger human health, it is a serious spreading pest in the Hawaiian environment that must be suppressed.

Edwin Mersino

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Edwin Mersino

Dear Mr. Mersino:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

JULY 20, 2010

ROSE MESSENGER

P.O. Box 57 PAHOA, HI 96778

808 965-1527

HAWAII DEPT. OF AGRICULTURE
PLANT PEST CONTROL BRANCH
1428 KING ST.
HONOLULU, HI 96814

TO: DR. NEIL REIMER

AS A LOVER OF NATURE, I AM QUITE DISTURBED BY YOUR PROPOSAL TO KILL ALL THE STRAWBERRY GUAVI ON EVERY ISLAND. THEY MAY BE CROWDING OUT OHIA IN THICKLY FORRESTED AREAS, BUT THEY ARE INCORPORATED INTO THE ECOSYSTEM IN OTHER AREAS. IF YOU HAVE A SORE ON YOUR BIG TOE, MUST YOU CUT OFF THE WHOLE LEG? I AM ALL FOR SAVING OUR OHIA, BUT THERE IS A BETTER WAY. PLEASE CONSIDER MORE OPTIONS.

WHEN THE GUAVI DISAPPEAR, SOMETHING ELSE WILL COME IN TO TAKE IT'S PLACE AND IT COULD BE EVEN WORSE. WHAT WILL HAPPEN TO NATURE'S CHAIN OF BIRDS, INSECTS AND OTHER LIVING THINGS? YOU CANNOT PREDICT THIS. FUNGUS/BUGS ARE ADAPTABLE. HOW WILL THEY AFFECT NATURE AS THEY ADAPT? YOU CANNOT PREDICT THIS. WHETHER IT'S BRINGING IN A MANGOOSE OR A SPIDER, THESE BIO CONTROL AGENTS NEVER WORK. PLEASE DON'T ENDANGER OUR ECOLOGY WITH ANOTHER ONE!

RIGHT NOW THERE IS A BLIGHT IN KAPOHO KILLING OHIA. WOULD YOU GIVE THAT SOME ATTENTION? SOMETHING IS UPSETTING THE BALANCE THERE. OTHER PLANTS ALSO CROWD OUT OHIA. WHY PICK ON JUST ONE OF THEM?

THE STRAWBERRY GUAVI COULD BE A VALUABLE RESOURCE FOR THESE ISLANDS. THE WOOD COULD BE HARVESTED, CREATING JOBS, AND THE FRUIT, LOADED WITH VIT. C MADE INTO JAM, ETC. PERHAPS THE WOOD COULD BE USED BY ISLAND ARTISANS TO MAKE UNIQUE HAWAIIAN FURNITURE AND CABINETS AND SUCH THINGS. IT IS HARD WOOD AND WOULD MAKE GREAT FIREWOOD. BY SPENDING OUR GOVERNMENT MONEY TO TURN GUAVI INTO A NATURAL RESOURCE, YOU WOULD NOT ONLY CLEAR IT AWAY FROM THE OHIA, BUT YOU COULD CREATE SOME GREEN JOBS AS WELL. WHILE THIS MAY REQUIRE A BIT MORE EFFORT ON YOUR PART, AREN'T OUR ISLANDS WORTH IT? AND IT IS, AFTER ALL, YOUR JOB TO KEEP THE ECO-SYSTEM IN A HEALTHY BALANCE — NOT TO ERADICATE ONE WHOLE SPECIES. PLEASE, SERIOUSLY CONSIDER WHAT I HAVE TO SAY.

YOURS TRULY,

Rose Messenger, M.A.



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii'i 96814-2512

November 1, 2011

Rose Messenger
P.O. Box 57
Pahoa, HI 96778

Dear Ms. Messenger:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your concerns about biocontrol, please see FAQ Nos. 3 and 5. Regarding your comment about other biocontrol targets, see FAQ No. 2. In regard to your comment about strawberry guava fruit and wood, see No. 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

1. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

2. The project will waste money and not achieve desired results.

In its native Brazil, where it has its own enemies, the scale insect results in a 25 to 40 percent reduction in vegetative growth rate and 60 to 90 percent reduction in fruit and seed production (p. 35). The anticipated reduction in fruiting and vigor of strawberry guava that would result from the proposed action would substantially benefit vegetation management efforts and increase the ecotourism value and the value of ecosystem services provided by native forests in Hawai'i (p. 55).

3. Blight in Kapoho killing 'ōhi'a.

We do not have first-hand knowledge of what is affecting 'ōhi'a in Kapoho, but here is a website you might consult for further information and contacts: <http://www.ctahr.hawaii.edu/forestry/disease/index.html>

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dear Department of Agriculture,

I support the release of the biocontrol scale insect to slow the spread of strawberry guava on Hawaii Island.

This noxious weed is a serious threat to our forests and an annoyance to homeowners, farmers and outdoor enthusiasts. Manual removal and even herbicide use is far too slow to stop this monster weed from advancing further into our last remaining native ecosystems.

I believe the research done in selecting and testing this biocontrol is sound and thorough. We should not delay the release of this insect any longer. While we wait the forest is being consumed.

Aloha,
Mitzi Messick

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mitzi Messick

Dear Ms. Messick:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 23, 2010

Comments for Hawaii State Department of Agriculture Draft EA for Biocontrol of Strawberry Guava

To Whom it May Concern,

Aloha(“in the presence of the breath of life”).

Please forward this commentary to the appropriate email of the DNLR.

At the outset, let me state without ambiguity that I would love to see the complete eradication of Strawberry Guava , *Psidium cattleianum*, from Hawaii. Having said that, I probably can only hope for some limited control. If we could turn back the hands of time; I would love to be in the Hawaii whose forests and other ecosystems were only comprised of the native endemic and indigenous species. Unfortunately, extinctions and all the anthropogenic changes through time make this impossible.

I have read the draft EA on the biological control of *Psidium cattleianum* with the gall forming scale, *Tectococcus ovatus*. As I stated earlier, I am in favor of the eradication, not just the control of, Strawberry Guava. However, these are a few concerns I have before this biocontrol is released into the environment. First of all, nature has infinite variables, and I hope there are procedures being developed that can sterilize or eliminate the biocontrol in the case the biocontrol makes a species shift in hosts in an unexpected future finding. Another aspect of this biocontrol is, what will succeed in the succession of growth in the forests? My mentor in Hawaiian endemic snails, was Dr. Yoshio Kondo. I have seen many native snail colonies exclusively on *Psidium* or routinely on *Psidium*. Although they feed on sooty mold and not directly on the guava, the EA does not adequately address the side effects on snails on trees infested with *Tectococcus*. This is not to discourage this control effort, but, just an observation. I wish all of the agencies involved in the control of Strawberry Guava; the greatest success. I just have to trust that all of the research is thorough and accurate and on-going.

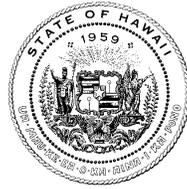
From the news reports I have read, it seems that the agencies involved have been running into great opposition. From my viewpoint as an amateur observer and researcher of Hawaiian native forests since the 1960's, I hope some of these words will strike a chord. There is no true wilderness in Hawaii, anymore. Forest managers are in effect, becoming gardeners. Choices are made to weed, outplant appropriate species, and sometimes even remove species for husbandry or cultivation ex-situ. I have seen the arguments surrounding exotic species, Polynesian introduced, and native species becoming increasingly polarized. More and more of our citizens are ignorant of what a native Hawaiian plant, much less a complex system as a forest, is. Virtual world will continue to divorce our citizenry from nature. In short, the vast majority of people have no idea or a distorted idea of what they stand to lose. I speak to you now as a gardener. In the perfect world, it would be great if island specific endemic plants were available to grow in urban gardens. They are rarely available...even abundant species.

Gardening is a major pastime, but, many gardeners will grow exotic or even invasive species. Only the governmental agencies can assist in the legal dispersal of seeds and/or propagules. Here I am speaking only about non-listed or non-threatened species. As one example, Olopua, *Nestegis sandwicensis*, is extremely rare in cultivation, but, makes for an important component in the forest and has the added benefit of being of easy culture. Recruitment of seedlings is declining in the forests. The general public must learn to grow these plants, love these plants, and plant hope that our native forests will recover to the extent currently possible. The interface between the public at large and the agencies must be palatable if a permitting process is needed, or the underground will dig in deeper. By growing support among the masses, agencies such as yours will also benefit. I grew up at a time when most people thought of native plants as, “rubbish”. Much has changed with increased education, but, I still believe the majority of people have a poor understanding of our fragile ecosystems. By cultivating appropriate and easily grown native plants on a larger scale, I envision a day when the tide will turn in favor of our unique endemic and indigenous species. This may seem to be a convoluted way to build support for our native forests, but, the control of Strawberry Guava is only one of many invasive species that need to be addressed.

Aloha and mahalo,

Leland Miyano, Landscape Designer, Sculptor, and Naturalist

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State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Leland Miyano
Landscape Designer, Sculptor, and Naturalist

Dear Mr. Miyano

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although the biocontrol agent, if released, will not replace the hard work of removing strawberry guava from areas already invaded, it is expected to provide a critical tool for managing this invasive plant and making other efforts more sustainable. In regard to your concern about the biocontrol insect shifting to another host, please see FAQ No. 5. As your other concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Irreversibility / consideration for mitigating nontarget effects

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. Based on the extensive prerelease investigations and the successful history of biocontrol projects that followed these research protocols, no adverse effects are expected and no additional mitigation measures have been planned. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

2. Succession by other plants species following control of strawberry guava

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species

will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest at higher elevations, where there are relatively few other alien weeds present, the chances of natives replacing strawberry guava are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. Because of the gradual nature of strawberry guava biocontrol and its compatibility with manual control, which it is expected to make more effective, preservation and restoration of native ecosystems should become more feasible for land managers.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators.

3. Impacts of strawberry guava control on native snails

As you have observed, native snails are sometimes found on common guava and strawberry guava trees. However these plants are not essential to snail conservation. Malacologists concerned with snail habitat and survival in Hawai‘i concur with statement in the EA by Dr. Daniel Chung, former Nature Conservancy and Bishop Museum biologist, that “strawberry guava leaf litter also is extremely poor habitat for the native terrestrial snail species. Wherever strawberry guava has spread, the native terrestrial snails have declined or died out.” Strawberry guava is specifically noted as a threat to native snail populations because it degrades their native forest habitat (Hawai‘i Comprehensive Wildlife Strategy 2005). Preservation of the vast array of unique native Hawaiian plants and animals, including snails, will ultimately depend on protecting whole ecosystems, and as you note, in many cases this will require active management. Without effective tools for controlling the most aggressive ecosystem-altering species like strawberry guava, we will continue to lose native species rapidly.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



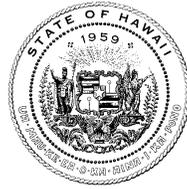
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

I support biocontrol of the strawberry guava! That stuff is getting out of hand. I have researched this and feel comfortable with the insect control. Once again, I support Ann Kobsa and what she's doing. Thanks!

Rachael Mooter

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Rachael Mooter

Dear Ms. Mooter:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Greetings,

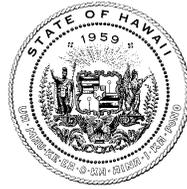
While extremely concerned about the idea of introducing a new insect into Hawaii with potential unforeseen consequences, we are aware first-hand of the huge problem of the invasive strawberry guava at least on Hawaii Island and Oahu. We spend a lot of time in the Puna and Volcano area and find that in some areas strawberry guava has totally obliterated all other plants including of course native plants. Because of this we are in favor of trying the biocontrol plan in a responsible manner.

Thank you,
Paul & Barb Morgan
2891 Oahu Avenue
Honolulu, HI 96822

*Paul F. Morgan AIA
Suzuki/Morgan Architects, Ltd.
1146 Fort Street Mall, Suite 204
Honolulu, HI 96813
ph: 808-528-1189*

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Paul & Barb Morgan
2891 Oahu Avenue
Honolulu, HI 96822

Dear Mr. and Mrs. Morgan:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

To whom it may concern,

I would like to make known my support for the biocontrol option for Strawberry Guava. As a resident of Hilo, a Master's Candidate in the Tropical Conservation Biology and Environmental Science at UH Hilo, and as a person of Hawaiian/Polynesian heritage I understand the implications that Strawberry Guava has on the landscape. I am also fully aware of the rigorous testing that biocontrols undertake before being proposed as a viable option for invasive species management. As such I believe that if these biocontrols have been given the go ahead, that they should be utilized to help manage the strawberry guava problem. Thank you very much for your time.

Sincerely,

Keenan Morrison

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Keenan Morrison

Dear Mr. Morrison:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I am writing in support of the biocontrol for the strawberry guava. I am a fruit farmer that would like to see less damage to my crops.

Please support.

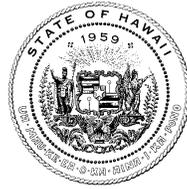
Therese Mulroy & Robert Mulroy

RR2 Box 3355

Pahoa, HI 96778

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Robert & Therese Mulroy
RR2 Box 3355
Pahoa, HI 96778

Dear Mr. and Mrs. Mulroy:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I am writing to express my strong and enthusiastic support of approving the release of the scale insect Tectococcus ovatus to slow the spread of strawberry guava (SG), Psidium cattleianum, in Hawaii.

SG has grown out of control and today is ruining our essential watersheds. It's also spoiling what's unique about Hawaii. SG is turning our hiking trails into a uniform wall of brown stems and shiny green leaves; hiking some trails today is more like walking in a continuous hallway—there is practically no view of the horizon and nothing interesting to look at close-up because only a few other weedy plants can grow there. SG is spoiling and wiping out the remnant communities of endemic plants and animals that I've come to know and appreciate during my 30 plus years of hiking in Hawaii, and which are part of the heritage of Hawaii's host culture.

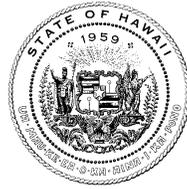
I understand that no one can turn back the clock and magically restore what's been lost to SG in natural areas. But we must not let it continue to spread and grow out of control. Human labor and herbicide treatments alone are not enough to even slow its spread. I am sure that if land managers keep on this track for managing SG infestations, SG will surely wipe out Hawaii's native plant communities from the watersheds and other natural areas that the State of Hawaii has an obligation to protect and preserve. I'm also sure that releasing the scale insect is very low-risk and that SG will be in good condition in both Hawaii and Brazil. The insect will not get out of control because it is very host-specific. Hawaii's biologists have a very good track record of recent, thoroughly researched and carefully tested releases of biocontrol agents. The releases have not caused problems. Releasing the scale insect is the best and most practical way to simply begin getting SG under control so I urge you to approve the release.

Thank you for reading this.

Charles Nagamine
Pesticide Safety Education Program
Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawaii at Manoa

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Charles Nagamine
Pesticide Safety Education Program
Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawai'i at Manoa

Dear Mr. Nagamine:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Stanley NAKASONE
7/21/10

D L & R:

We grow up with strawberry guava all our lives, living in the Country.

We all know what strawberry guava is but we all don't know what an endangered plant look like.

Getting rid of the strawberry guava will cause erosion and landslides all over. As you walk into the hills and mountains, the guava is holding all the soil and rocks in hills and valleys. The guava is also helping to collect moisture in the highlands and watersheds. Without the strawberry guava collecting moisture, we'll see the drought written.

We hunt all the highlands and the Waianae and Koolau mountains are all covered with strawberry guava. Imagine what will happen years from now with bare hills and mountains with lots of erosion and landslides with more mud running into the ocean from mountain streams and no strawberry guava trees to help with rain. Will the endangered plants be able to do what the strawberry guava is doing?

We hunted the highlands of Molokai, the hills and mountains are all covered with strawberry guava holding the soil and rocks. Imagine

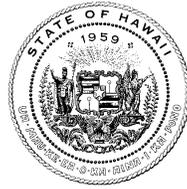
bare hills and mountains just to protect a few endangered plants.

Do people go into the mountains to look at endangered plants?

Why don't the state make a study to control the pesky Christmas berry and the new tree that is overtaking the hills and valleys. Take a drive to Wahiawa and you'll see the trees spreading like wildfire. It took only a few years for the tree to spread.

The Christmas berry is just spreading wild and choking everything under it. On the island of Lanai, thousands of dollars was spent to fence the endangered trees to keep the deer out. Today, the Christmas berry tree has taken over the endangered trees and the Christmas berry tree made a good home for deer in the fenced area.

A few years ago, the whole island was affected by some bug that killed off the rose apple trees. Everywhere you went, the rose apple vanished because of some little bug. Who let the bugs go? As little kids, we enjoyed going into the valleys to pick the sweet rose apples but no more. What will be next, Mountain Apples, any wild fruits? just let Nature alone!



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Stanley Nakasone
61 Nanea Ave.
Wahiawa, HI 96786-2328

Dear Mr. Nakasone:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comment about the role of strawberry guava in the Hawaiian environment, please see FAQ No. 1. Regarding your comment about other invasive species, see FAQ No. 2. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. People are familiar and satisfied with strawberry guava but do not know or need endangered plants.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

Although it is true that it is hard to find many endangered species, the work of biologists and horticulturists have helped bring many back into the more commonly accessible parts of the landscape. With more work, we and our grandchildren will be able to see and appreciate these marvels of evolution that help make Hawai'i unique. Many plants that are not now endangered may become so if we do not aggressively address the threat of invasives such as strawberry guava.

The proposed action would benefit both endangered species and people in substantial ways, through improvement of watersheds, reduction of the spread of thickets into hunting and recreational areas, and preservation of ecosystem diversity, which has myriad human benefits. It would also benefit Hawai'i's agriculture – improving our self-sufficiency and potentially increasing exports.

2. Killing strawberry guava leaves ground susceptible to erosion.

Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be

moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil-holding species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion (p. 54). The forests of Hawai'i are important zones of water input that can be adversely affected by factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology. In fact, strawberry guava has been found to reduce recharge to the island aquifers compared to native forest.

Forests of eucalyptus on Maui, loblolly pine at Koke'e on Kaua'i, miconia on the Big Island, and strawberry guava statewide exhibit similar structural characteristics: a dense uniform canopy with very little understory. In native Hawaiian forests, the impact of raindrops is buffered by leaves of upper canopy trees such as 'ōhi'a and koa, and then again by leaves of subcanopy trees such as mehame, kopiko, hapu'u and kolea and again by epiphytes, ground ferns, mosses, and layers of decomposing branches and leaves. The forests also help block winds and retard evaporation. That is not the case with the dense stand structure and high foliage biomass of strawberry guava, suggesting that for many decades to come these forests will be diverting water that would otherwise recharge aquifers and streams (pp. 55-56).

3. *Christmas berry.*

We agree that this species is highly invasive and seriously threatens Hawaiian ecosystems. Christmas berry remains a high priority target for biocontrol research in Hawai'i. In the future we expect to take advantage of ongoing biocontrol research in Florida, where it is also a serious weed.

4. *Fungus on rose apple.*

The Department of Agriculture is aware of and concerned about the rust fungus that affects rose apples and other members of the myrtle family. No agency of the State or federal government introduced the *Puccinia* rust to Hawai'i. It is one example among many hundreds of organisms introduced inadvertently through trade and travel that have come to have harmful effects. In fact, such introductions are the reason for careful scientific biocontrol efforts, not a reason against them. For more information on the *Puccinia* fungus you might be interested in this publication available online: <http://pubs.usgs.gov/of/2010/1082/>.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Rachel Neville
Honolulu, HI 96821
rachel_neville@yahoo.com

July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I support the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna. Releasing a natural control for strawberry guava is necessary to protect Hawai'i's native forests.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

O'ahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that 'ōhia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ōhi'a and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawai'i's

native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai‘i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give ‘ōhi‘a and koa seeds a chance to sprout.

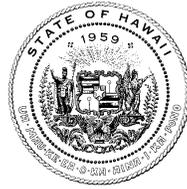
Like Hawai‘i’s language and culture, Hawai‘i’s forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava’s natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,



Rachel Neville

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Rachel Neville

Dear Ms. Neville:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

129 Waiua Place
Kihei HI

16 Jun 2010

Dear Dr. Reimer,

As a resident of Maui for the last decade, who landscapes with native plants, I would like to go on record in support of introducing a biocontrol for strawberry guava. I've seen the effects of some of invasive stands personally. If left unchecked, I fully agree that it will have a negative effect on the ability of Maui to recharge aquifers from what rainfall we get and increase runoff, with resulting reef degradation offshore.

The risk/benefit ratio of biocontrol is fully in favor of biocontrol.

I only wish the opponents of releasing biocontrol were as vociferous in their opposition to inadvertent introduction of deleterious alien invertebrates – in the time I've lived on Maui, I've seen the following become pests: hibiscus mite, hala scale, papaya mealy bug, erythrina weevil, erythrina gall wasp, a bougainvillea pest [which mine seem to be able to resist handily, more's the pity]. I think I've forgotten a few. But I've managed to list one new pest for every 2 years I've lived here! And each of them has far more deleterious effects than the strawberry guava biocontrol will have.

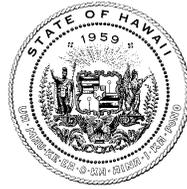
Sincerely,



Irene Newhouse

Cc: Paul Conry

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Irene Newhouse
129 Walua Place
Kihei, HI 96753

Dear Ms. Newhouse:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 16, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



NATIVE HAWAIIAN PLANT SOCIETY

P.O. BOX 5021 , KAHULUI, MAUI, HAWAII 96733

Nanea nā pua o ka 'āina aloha

Hawai'i State Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

22 June 2010

Dear Dr. Reimer,

The Native Hawaiian Plant Society is an organization on Maui dedicated to education and outreach regarding Hawaii's unique native plants, as well as their preservation and restoration to the wild.

We support introduction of *Tectococcus ovata* scale against strawberry guava, which extensive studies have shown to be highly specific to guava. We are fully cognizant of the damage to Hawaii's biodiversity and to the watershed already caused by the spread of strawberry guava.

Sincerely,

Irene Newhouse
NHPS Secretary

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Irene Newhouse, Secretary
Native Hawaiian Plant Society
P.O. Box 5021
Kahului, HI 96733

Dear Ms. Newhouse:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Comments on the EA and Proposed Release of *Tectococcus Ovatus*

I live and work in a forest on the Hamakua Coast of Big Island that contains a large quantity of strawberry guava. I feel the introduction of the Brazilian scale insect, *tectococcus ovatus*, to control the spread of strawberry guava in Hawaii is a serious mistake that will have unintended and potentially disastrous consequences for the entire forest. The environmental assessment issued in support of releasing the insect is a highly biased and inadequate document. Any release of *tectococcus ovatus* should be delayed until a *full environmental impact statement* has been done. This means approaching the problems associated with waiawi in the context of balancing the forest as a unified ecosystem rather than radically excising a large part of it.

The proponents of releasing *tectococcus ovatus* say it will only attack waiawi and will not spread to other flora, even plants closely related to waiawi. This, although it is a definite concern, is not the main problem. The real danger is an unbalancing of the forest ecosystem. What a release will do is make the forest sick so other diseases can take hold. Hawaiian history is rife with stories of this. Lilokoi or passion fruit grew abundantly here until an outside agent was introduced to kill banana polka. Now lilokoi fruit is empty, hollow. Puccinea rust is a disease that is getting a hold here. It is attacking the rose apple. Waiawi has become infected with the rust when it grows directly beneath the rose apple. Additionally, puccinia rust has attacked some ohia. With tens of thousands of acres of sickened, weakened waiawi acting as a vector, the puccinia rust could spread deeply into the native ohia forest. It could completely overrun ohia. We would then be talking about disastrous environmental collapse. This is only one of many scenarios an impartial systems analysis, a *full environmental impact statement*, could discover.

Proponents of the release of *t. ovatus* say that by weakening waiawi, the native forest will be able to reassert itself. How would this work? They don't say. I believe the result will be just the opposite. Disease will spread through the weakened forest and native plants will have no chance to succeed. This destruction will impact public lands as well as private property. People and animals that eat the fruit of strawberry guava will be deprived of it. The resource of the wood of waiawi will be lost. Property owners who use waiawi as an ornamental plant and as a windbreak will suffer. The air will be contaminated by the insects and their detritus and will be a health risk for people with asthma and other respiratory ailments. *The state will bear ultimate financial responsibility for damages done to one and all. This at a time when our economy is in such bad shape.*

I ask in all seriousness, is this what we want for our environment? If we really want to re-establish the native forest, shouldn't we be very careful not to go off half-cocked as has been done over and over in the past. Once the genie is out of the bottle, it can't be put back. Shouldn't we try to come to a real understanding of the problem rather than using brute force and stupidity to make it infinitely worse? I think the proponents of this release see bio-control as a magic bullet. Within their wisdom, they think that they can neatly, efficiently and swiftly

reverse nearly 200 years of waiawi integration into the Hawaiian ecosystem without severely compromising and damaging both that system and the people who live here, enjoy and depend on it.

Please don't accept the EA. Please mandate a full and impartial environmental impact statement before any other action is taken. Thank you.

Patrick O'Kiersey
46-3775 Old Mamalahoa Hwy
Honokaa, Hawaii 96727-7035
(808) 775-7185
patrickmok1@hotmail.com

+++++



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Patrick O'Kiersey
Honoka'a, Hawai'i

Dear Mr. O'Kiersey:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA and we note your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect attacking other plants and the impact it will have on the supply of fruit, please see FAQ Nos. 5 and 8, respectively. As some of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects, which is the criterion that determines whether an EIS is necessary.

2. Dying strawberry guava will spread plant diseases to 'ōhi'a and other native plants.

This scenario is particularly unlikely for several reasons. First, strawberry guava is not expected to die from the scale insect. It has never been observed to kill even small potted plants under extremely high infestation levels. Strawberry guava is not significantly impacted by diseases currently in Hawai'i, and apparently not in Brazil either, where it is mostly affected by insects. If a guava rust affecting strawberry guava emerges in Hawai'i, it is most likely to affect principally strawberry guava itself, with its inoculum relatively ephemeral in the environment and not likely to have strong effects on less susceptible species.

3. A previously released biocontrol for banana poka has affected lilikoi.

There is no documentation of lilikoi ever being attacked by the biocontrol organisms, only by some other generalist pathogens. HDOA has observed generalist pathogens on lilikoi in Hawai'i, but never the *Septoria passiflorae* agent that was released to control banana poka.

4. Release would violate private property rights.

First, it is important to note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, and any party interested in using strawberry guava for any purpose will continue to be free to do so. There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably bring increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

5. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

6. The government could be held liable for damages to trees on private property.

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving a still attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of private property rights, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. For example, construction of new highways that serve the State's motorists invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

7. *The action will be irreversible.*

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai‘i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long horizontal flourish at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

July 20, 2010

Hawaii Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

To Whom It May Concern:

This letter is in response to the Draft Environmental Assessment (DEA) dated June 2010 regarding the biocontrol of strawberry guava. I **strongly oppose** the Department of Agriculture releasing a Brazilian scale insect for biological control of strawberry guava.

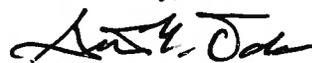
At my parents' property, in Manoa Valley, we have two beautiful 15-foot strawberry guava trees. They are lush and produce abundant amounts of delicious fruit. In addition, these trees have attractive marbled wood. I take great effort and pride shaping these trees; pruning them to have a full and rounded canopy. We use the fruit for making guava jelly to share with friends, neighbors, and relatives. It would be a shame not to be able to do this anymore and would rob future generations of this tradition should the amount of fruit the trees produce be reduced or possibly eliminated.

Should the scale insect be introduced, it will create leaf galls that will destroy the appearance of the trees. Leaf galls are not "little noticed" as mentioned in the DEA. Leaf galls are highly visible as they can be seen on infected banyan trees to hibiscus shrubs. The DEA suggests using horticultural oils to control the scale insect. How am I supposed to spray horticultural oil on 15-foot trees? I'm sure my neighbors will not be happy with airborne oils or worse, the need to use a strong insecticide. If it's necessary to use an insecticide, I will no longer be able to enjoy the fruit. I highly doubt the State will reimburse me for purchasing horticultural oils or insecticides to spray on my trees to control the insect they released; or the need to hire a contractor to do this maintenance work.

Should the scale insect be released on State DLNR lands, it will inevitably reach my parents' trees in no time. The insect will weaken the trees; and with the deterioration of the trees health, it could eventually kill my trees and become a liability issue should the trees fall. I will document the health of my trees and should something happen, I will file a claim.

In closing, I have no problem with the State manually controlling the strawberry guava in the forest for the reasons mentioned in the DEA. However, to adversely affect all strawberry guava trees in the state including those on private properties (by releasing an insect) is wrong. It would be just like if I was a careless neighbor and I sprayed weed killer in my property and have the wind drift take it over to my neighbor's property and kill their plants. The State needs to be a responsible neighbor.

Sincerely,



Grant M. Odo

c: Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325,
Honolulu, Hawaii 96813

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Grant M. Odo
1994 Iwi Way
Honolulu, HI 96816

Dear Mr. Odo:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA. Your opposition to the biocontrol plan is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about impact on the fruit of your trees, please see FAQ No. 8. Regarding the aesthetic impact, see No. 9. In regard to your comment about manual eradication, please see No. 4. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Strawberry guavas in Manoa Valley

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. Because of its limited dispersal ability, the biocontrol insect is unlikely to colonize isolated trees far from forested areas, which may mean that many homeowners will never encounter galled plants. However in the event that a yard tree is colonized by the insect, horticultural oils may be used to control the insect and help maximize fruit production

We understand your concern with protecting your private property, in this case your strawberry guava trees. We do understand that keeping them fruiting and looking exactly as they are may cause extra trouble and expense for you and others as well. However, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of strawberry guava, a highly invasive species that

is devastating native forests and the natural and cultural resources they contain.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

June 29, 2010

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Dear Dr. Reimer:

I am writing in support of the draft environmental assessment (DEA) done with regard to biocontrol of strawberry guava by its natural control agent for preservation of native forests in the Hawaiian Islands. In reviewing the DEA, I found it to be well-reasoned and addressing comprehensively the release of the agent *Tectococcus ovatus*. It is clear from the DEA that many years of research have gone into testing this agent and its availability as a tool to manage strawberry guava is critical for several reasons:

- **Preservation of island water supplies.** Already, U.S. Geological Survey (USGS) data over the last 100 years has shown that rainfall has been decreasing. Healthy, diverse native forests are critical for the collection and absorption of water into our aquifers (which provide 99% of our state's drinking water). Strawberry guava greatly degrades native forests and destroys their functionality (studies have shown that 27-53% of water is lost in forests invaded by strawberry guava);
- **Conservation of Native Hawaiian culture.** Strawberry guava impacts many native habitats and species which perpetuate Native Hawaiian culture;
- **Threat to local agriculture.** With sustainability a concern for most island residents, supporting local agriculture is important. However, strawberry guava is a reservoir for fruit flies, which can significantly impact crops;
- **Cost effective for everyone.** Physical, mechanical, and chemical controls are available as tools to combat strawberry guava. However, these tools have their limits with regard to labor required, cost, and reach (e.g. inaccessible terrain). It would take millions to control the spread of existing as well as future populations of strawberry guava into critical watershed areas. *Tectococcus ovatus* would be a cost-effective method to control such populations for government agencies, non-profit organizations, and land owners;
- **Eradication is not possible, but control is.** The agent will not eradicate strawberry guava, but merely give land and resource managers another tool to help with control of it in certain critical watershed and native habitat areas. For those who use the wood or eat the fruit, strawberry guava will not be gone as a resource for these uses.

As Art Medeiros of USGS said in a recent Honolulu Star Advertiser article, "the house is on fire, and we're arguing about whether the carpets are going to get wet." For these reasons, I urge the approving agency (Department of Land and Natural Resources, Division of Forestry and Wildlife) to issue a FONSI for the final EA.

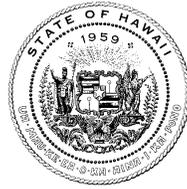
It is my hope that the HDOA continues to support this and other biocontrol initiatives that have been equally well-tested, thought out, and have clear benefits for the residents of our state and our unique natural resources.

Sincerely,


Christine Ogura
csogura@gmail.com
O'ahu resident

Cc: Department of Land and Natural Resources
Division of Forestry and Wildlife
Attn: Paul Conry
1151 Punchbowl Street Room 325
Honolulu, HI 96813

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Christine Ogura

Dear Ms. Ogura:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 29, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. We share your commitment to thoughtful development of new strategies and tools such as biocontrol of strawberry guava for managing invasive threats to our environment and economy. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

----- Original Message -----

From: Hank Oppenheimer

To: Neil.J.Reimer@hawaii.gov ; rterry@hawaii.rr.com

Sent: Monday, July 19, 2010 4:57 PM

Subject: Strawberry guava bio-control

Aloha,

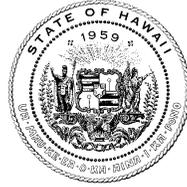
I am strongly in favor of the release of the biological control agent for strawberry guava. This is one of our worst forest weeds, displacing native biota and degrading our watersheds. Manual and chemical control are not feasible over such extensive stands in remote and rough terrain.

Mahalo!

Hank Oppenheimer

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Hank Oppenheimer

Dear Mr. Oppenheimer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

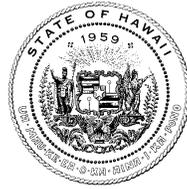
Becky Ostertag

Aloha,

I'm a tropical forest ecologist but I speak as a private citizen. Strawberry guava is one of the most invasive plants in Hawaii. It is wholeheartedly changing the structure and function of Hawaiian forests. The research done on this biocontrol is sound, and I support releasing the biocontrol. Yes there is a small risk, but in my opinion the risk of inaction will have much more dire consequences for the ecology of native Hawaiian wet forests.

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Becky Ostertag

Dear Dr. Ostertag:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 6, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

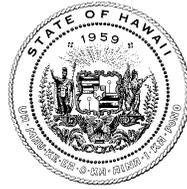
I have a 30 year old waiwi tree in my front yard that is well kept, decorative, and provides my family with many enjoyable occasions consuming its delicious fruit. I would like to know the name of a recommended insecticide I can use to keep the proposed insect from harming my tree.

Mahalo,

Franklin Pa

+++++

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RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Franklin Pa

Dear Mr. Pa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 27, 2010, on the Draft EA about the tree in your yard. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. What safe insecticides will work to keep the fruit coming?

Even if it will not be as abundant, people will still be able to pick fruit as Brazilians continue to do in their forests where the trees are preyed upon by this insect and many other insects (p. 50). Those who want to keep the scale insect from affecting their trees can control them by application of appropriate insecticides, which will reduce leaf galls. However, given the scale insect's limited dispersal ability, most property owners are unlikely to see effects on their trees for many years, if ever. If homegrown strawberry guava trees should develop insect galls, they could be protected by spraying organic or petroleum-based horticultural oils commonly used on fruit trees to control scales and other pests.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

For the record:

I oppose the use of biocontrol to kill strawberry guava, one of tastiest fruits among the myriad introduced species in Hawaii.

Christopher Pala
3731 Pukalani Place
96816 honolulu
808 391 0317

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Christopher Pala
Honolulu

Dear Mr. Pala:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your comment letter dated July 5, 2010, on the Draft EA. We have noted your opposition to the biocontrol release. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the consumption of fruit, please see FAQ No. 8. Also, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I am writing in support of the proposed strawberry guava biocontrol. As a biologist, I have seen firsthand the destruction of native forest by strawberry guava. As a farmer here in Puna on the Big Island, I have to say that strawberry guava is about the worst weed we have to contend with.

Hawaii is, biologically, possibly the rarest place on earth. Much of the biodiversity present in pristine times is now lost. We owe it to our children and grandchildren to at least try to preserve some small part of what once was.

Please do not listen to those vocal few individuals who have no concern or understanding of our Hawaiian natural heritage or the threats to it, but are only seeking to create an "issue" for their own political purposes.

Rex Palmer, Ph.D.
P. O. Box 637
Pahoa, HI 96778

+++++

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Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Rex Palmer, Ph.D.
P.O. Box 637
Pahoa, HI 96778

Dear Dr. Palmer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I support the control of strawberry guava by its native control insect. I truly believe there is no other way than a biocontrol. People who advocate hand clearing have possibly never been in native forest infested by it – it is way beyond hand clearing. Even if cut and poisoned, it will frequently grow out from the roots. This is really the only way to allow the last remnants of the Hawaiian native rainforests to continue to live. It will slow the growth and spread rates enough for native forest to have a chance.

There will still be strawberry guava. Pigs are omnivores and won't miss so much of it. People eat many different kinds of fruit. We will still have an abundance of fruit.

Present day scientific studies cannot be compared to the misguided and unresearched introduction of the mongoose. This scale insect has been researched for 15 years and has been shown not to have an effect on other kinds of guava or ohia.

There are those who say that the strawberry guava should be here because it has just as much a right to be here as our native rainforest, but does our native forest have any right to be here? If strawberry guava cannot be controlled, and soon, our native rainforests will have had their rights taken away.

Malama aina,

Sherry Palmer

P.O. Box 1255

Pahoa, HI 96778

+++++

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Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sherry Palmer
P.O. Box 1255
Pahoa, HI 96778

Dear Ms. Palmer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



July 22, 2010

Dr. Neil Reimer
Hawai'i State Department of Agriculture,
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawai'i 96814

Dear Dr. Reimer,

The Maui Conservation Alliance (MCA) is a group of land managers, policy specialists, and scientists working together to conserve and manage Maui County's natural resources. Our hui is devoted to developing and supporting intelligent policy decisions that will assist our County's conservation of its natural communities as well as support healthy economic and human activities.

In light of that mission, we are writing to support the introduction of the carefully tested strawberry guava (*Psidium cattleianum*) biological control into Hawai'i by the U.S. Forest Service.

The watershed forests of Maui County are one of our region's most critical sectors of our natural capital, supplying us potable water and habitat for Hawaiian plants, birds and insects. Many of these species are unique to Maui and listed as endangered by the U.S. Fish and Wildlife Service. Strawberry guava threatens the future existence of all of this.

This Brazilian species has acted to progressively displace native Hawaiian *Metrosideros* and *Acacia* watershed forests in Maui County and continues to spread. Physical and chemical control of this species at the scale it has now invaded is beyond feasibility and budgetary limitations.

This destroys the natural balance of our native Hawaiian forests and continues to cause landscape level extirpation of many native species, including the likely extinction of Maui County taxa within the next few decades. In a recent paper by scientists Simberloff and Holle, they termed this effect most prevalent on eastern Pacific islands, landscape level "invasional meltdown."

Recent research by University of Hawai'i scientists has demonstrated much lessened water storage and greater water evapotranspiration in invaded strawberry guava (*Psidium cattleianum*) forests versus our native 'ōhi'a (*Metrosideros polymorpha*) forests. Take home message: strawberry guava forests store less water and lose more water to the atmosphere than our native forests.

Basically, the invasion of strawberry guava contributes to widespread loss of native Hawaiian species of plants and animals and is a chief component in decreasing the functioning of Maui County's watershed forests.

To honor the MCA's mission and goal to protect Hawaiian forests, we fully support and encourage the release of the carefully tested strawberry guava (*Psidium cattleianum*) biological control agent, *Tectococcus ovatus*, by the U.S. Forest Service.

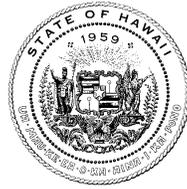
Respectfully submitted,



Kūhea Paracuelles
MCA Chairperson

xc: Mayor Charmaine Tavares, County of Maui

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RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Kuheia Paracuelles, Chair
Maui Conservation Alliance

Dear Ms. Paracuelles:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating Maui Conservation Alliance's support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts, including yours on behalf of native ecosystems in Hawai'i, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Maui Nui Seabird Recovery Project

4234 Hana Highway, Ha‘iku, HI 96708.5404

808.280.4114 – jayfp@hawaii.edu

2010 July 19

State of Hawai‘i, Department of Agriculture, Dr. Neil Reimer
1428 South King Street, Honolulu, Hawai‘i 96814

Geometrician Associates, Ron Terry
PO Box 396, Hilo, HI 96721.

DRAFT ENVIRONMENTAL ASSESSMENT – Bio-control of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

I fully support and encourage the expeditious release of the scale insect from Brazil, *Tectococcus ovatus*, for biological control of strawberry guava, (*Psidium cattleianum*).

I work on the islands of Maui Nui to find, protect and enhance populations of endangered, threatened and indigenous seabirds. Having found a significant population of the endangered Hawaiian petrel (*Pterodroma sandwichensis*) on the island of Lāna‘i, I have built a program with four full time employees. The most significant threat to the continued existence of the Hawaiian petrel colony on Lāna‘i is the invasion of alien weeds in the colony area. By orders of magnitude, strawberry guava, (*Psidium cattleianum*) is the most habitat altering, destructive species present. My crew spends much of their time working to limit and push back the spread of strawberry guava. The island of Lāna‘i has one watershed. The Hawaiian petrel colony is contained within that watershed. Strawberry guava is as much of a threat to the viability of the watershed as a moisture collector and feeder for the island’s aquifer as to the petrel colony. The costs of manual and chemical control of strawberry guava are well documented in the draft EA we are considering here. Bio-control may help to reduce our costs and will certainly help to, at least, slow the seed dispersed advance of the scourge.

As I continue to search for colonies of seabirds on Maui, Moloka‘i and Lāna‘i, I constantly find strawberry guava invasions in native plant communities. There are few resources available to address the extent of the problem. At least, if we can release this bio-control, we will be able to know that we have begun to have “added rocks to the backpack” of strawberry guava. That is, we will have made it a bit more difficult for the plant to be so successful, and perhaps, we will give native plants a bit of light until we can marshal the resources to more effectively suppress the invasion.

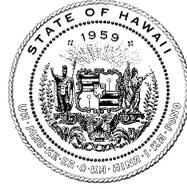
The conclusion of the Draft EA states simply and accurately the truth:

“...the proposed action will have a positive impact and that no action will have a negative impact. The proposed action alternative will serve to enhance valued natural and cultural resources within Hawai‘i’s forested areas and beyond, and will have no significant adverse impact on any cultural resources, practices or beliefs. The no action alternative has an unmitigated significant negative impact. No action will lead to continued degradation of Hawai‘i’s valued natural and cultural resources as strawberry guava continues to spread rapidly and overwhelm native forests.”

Jay Penniman
Research Specialist

A project of Tri-Isle Resource Conservation & Development in association with Pacific Cooperative Studies
Unit of the University of Hawaii and Hawaii Division of Forestry and Wildlife.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jay Penniman
Research Specialist
Maui Nui Seabird Recovery Project
4234 Hana Hwy.
Ha`iku, Maui 96708-5404

Dear Mr. Penniman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian bird species, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



Supporting the Release of *Tectococcus ovatus*
for control of *Psidium cattleianum*
Submitted to Hawaii Department of Land & Natural Resources
July 22, 2010

The Maui Invasive Species Committee (MISC) supports the release of the biocontrol agent, *Tectococcus ovatus*, for the control of *Psidium cattleianum*, also known as strawberry guava. The recently published Draft Environmental Assessment has done an excellent job of summarizing the need for this biological control, while thoroughly documenting and addressing the biological, environmental, cultural, and socio-economic concerns that have been raised about the potential release. The following comments are limited to aspects of the Draft EA related to environmental and worker safety benefits.

Hawaii's biological resources will benefit from the release of this agent. The extent of strawberry guava's incursion into our native forests is undisputed. The Draft Environmental Assessment identified more than 75 Threatened or Endangered (T&E) plant species and 24 T&E animal species that are likely to benefit from biological control of strawberry guava. The Draft EA also noted the negative impact that strawberry guava has had on the health of our watersheds: in addition to its ability to outcompete and displace native vegetation, a forest dominated by strawberry guava, when compared to a healthy native forest, results in a much higher rate of evapotranspiration, meaning less water for our aquifers.

The costs of chemical and mechanical control of strawberry guava are well documented in the Draft EA, but one aspect of chemical / mechanical control that received very little mention is the issue of worker safety. Staff from the Maui Invasive Species Committee participated in chemical and mechanical control of this species on the island of Lanai. The infested areas on Lanai where this work occurred included both dense thickets of guava and also areas of lower density. The area on Lanai invaded by strawberry guava includes some very steep slopes. Control efforts on Lanai were focused just off the Munro Trail, some of it on a relatively flat area, but also on steep and often slippery slopes. Mechanical tools included chainsaws, a chipper, and hand loppers. Strawberry guava is very "springy" making control of saplings hazardous. Use of a high-powered chipper, chainsaws, and herbicide are inherently dangerous. Using them in challenging terrain significantly magnifies the risk to the workers. Use of *T. ovatus* to slow the spread of strawberry guava would have a great benefit in avoided risk to worker safety.

The Draft EA addresses concerns about the potential for *T. ovatus* to shift hosts. The organism has been extensively studied in both Hawaii and Florida, with scientists concluding that there is a very low likelihood that *T. ovatus* would shift its preference or evolve to rely on a different species, such as the common guava (*Psidium guajava*).

On balance, it is clear that release of the biological control agent, *Tectococcus ovatus*, is warranted and needed. The Maui Invasive Species Committee requests that the Department of Land and Natural Resources grant approval for its release.

Teya M. Penniman
Manager

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Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Teya Penniman, Manager
Maui Invasive Species Committee
P.O. Box 983
Makawao, HI 96768

Dear Ms. Penniman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating the Maui Invasive Species Committee's support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

As you note, by slowing the spread of strawberry guava into native forests, biocontrol may allow us to avoid having to perform future chemical and mechanical control in remote, rugged terrain, efforts which are inherently risky to workers.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



Lanai Forest and Watershed Partnership

Bryan Plunkett, Coordinator

P.O. Box 630129; Lanai City, HI 96763

Phone 808-565-3218; Cell 808-559-0444; Fax 808-565-3325

July 22, 2010

Re: Testimony in support for strawberry guava biocontrol

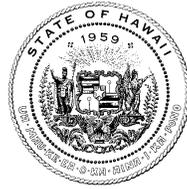
Aloha,

The Island of Lana'i relies significantly on fog drip to replenish our aquifers and the natural native forest has to be restored to provide the best possible means to capture the fog as it passes over Lana'ihale mountain. The strawberry guava invasion in our forest is a detriment to our efforts to protect the watershed and provide precious water for our future generations. The strawberry guava crowds out and kills off the native forest and its root system does not allow for any native understory growth which is necessary to capture the fog drip and allow the water to filter down into our aquifers. Not only is it detrimental to our water recharge ecosystem, but also, is reducing the habitat for the endangered 'U'a'u, or, Hawaiian Petrel, which nests on the slopes of Lana'ihale in the uluhe ferns which is being crowded out and replaced with the strawberry guava. We face a tremendous challenge to control this invasive specie with limited funds but we have to start somewhere and I believe the strawberry guava biocontrol will give us a chance in controlling it. I fully support the release of the strawberry guava biocontrol.

Mahalo,

Bryan Plunkett

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bryan Plunkett, Coordinator
Lana'i Forest and Watershed Partnership
P.O. Box 630129
Lana'i City, HI 96763

Dear Mr. Plunkett:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 14, 2010

**Hawaii State Department of Agriculture, Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814
Attention: Dr. Neil Reimer**

**Subject: Biocontrol of Strawberry Guava by its Natural Control Agent
for Preservation of Native Forests in the Hawaiian Islands**

Dear Dr. Neil Reimer;

As a life time resident and student of natural sciences in the Hawaiian Islands, I respectfully stand in opposition to the release of Tectococcus Ovatus. I am fully educated on the subject, and have read the DEA. I am aware of the problems and values of the native forests. Never the less, these are my concerns:

- This biocontrol agent will not be accompanied by the natural control agents of its native environment. The consequences of this could be devastating, especially in combination with drought, which often occurs in Hawaii.**
- In the lower elevations, a much worst invasive plant species is ready and waiting to replace the Strawberry Guava. On the Big Island this probably would be palm or cattle grass, the autograph tree, pilau maile, etc.**
- Insects usually seek warmer temperatures, and the dominant population of the Tectococcus Ovatus may eventually migrate to the lower elevations. The proximity of Hawaii to the equator varies from that of Brazil, as do temperatures.**
- While the Strawberry Guava is invasive in the upper elevation native forests, they are not in the low lands. The rather, they are a graceful lovely foliage providing valued fruit, road buffers, shade, and weed control.**

- They often add to property value, and the loss or damage infringes on property rights. To treat the SG with pesticide is costly, time consuming, and harmful to the environment.
- While acquiring signatures on petitions to save the SG, I found that the majority of the public is unwilling to lose the beauty and benefits of SG in the day to day environment. Not many want more sick vegetation after suffering the ugliness of the dyeing rose apple and wiliwili.
- To use this method of attack without a plan or ability to replace the SG as it weakens seems irresponsible. This leaves biocontrol and massive use of herbicides as the only recourse. Filling our environment with more and more non-native biocontrol agents is reckless and contradictory.
- The Big Island hunters are not willing to suffer the degradation of the wild pig population. The public enjoys the naturalized bird population.

As an agency of the Government, please reconsider the values and rights of all of the people of Hawaii.

Sincerely,

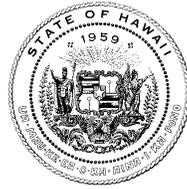
Nani K. M. Pogline

HCR 1-Box 5209

Keaau, HI. 96749

Email: nanihawaii@aol.com

Ph. 982-8332



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Nani Pogline
HCR 1 - Box 5209
Keaau, HI 96749

Dear Ms. Pogline:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the testing of the scale insect, please see FAQ No. 6. Regarding your concern about biocontrol in general, see No. 3. As for your comment on biocontrol on other species, see FAQ No. 2. For more information on the impact of strawberry guava on the Hawaiian environment, please see No. 1. Regarding the aesthetic impact of the scale insect, see No. 9. Regarding the biocontrol's impact on fruit, see No. 8. And as for the impact on pig populations, see No. 7. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

2. *Strawberry guava not invasive in the lowlands.*

The experiences of dozens of land managers throughout the State of Hawai‘i has shown that this is not true.

3. *Release would violate private property rights.*

There are many instances in which the State must balance the needs of its entire population and the State’s resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai‘i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

July 8, 2010

To whom it concerns:

Regarding the project: Biocontrol of Strawberry Guava, I recommend the No Action Plan. My reasons for this recommendation include:

- 1) The project is costly and unnecessary. Pre-contact Hawaii was relatively barren, with only a few grasses and plants established. Contact brought and continues to bring new species. Who decides the relative value and desirability of these species has not been discussed or answered. Therefore, to let a department or agency to make this decision is premature and intolerable.
- 2) Some discrepancies are apparent in the EA: on page 64 it states, "even the estimated 60-90% reduction in fruiting and 25-40% reduction in vigor would leave enormous untapped resources of wood and fruit." This is inaccurate in that the remaining percentage of available fruit and wood will become harder and harder to reach, collect and utilize as the guava declines. Therefore the percentage of usable fruit and wood is not assessed accurately and may not be able to be assessed accurately at this time.
- 3) Another discrepancy on page 65, "the expected reduction of density...(will) have a beneficial impact on...travel within the forest." This is arguable and unassessable at this time also. The areas cleared with guava will fill in with pilau maile, popoke, which is covered with thorns, Christmas berry, which is impassable and other vines, shrubs and thickets - fast growing species which will make travel extremely difficult. Addressing this issue on page 42, "...monitoring program will include evaluation of vegetation change..." Monitoring will have to be accompanied by hand-weeding, poisoning, etc. to keep other invasive species from taking over. If pilau maile takes over, the outcome would still be loss of watershed, as it smothers everything in its path.

There are too many uses for strawberry guava, including biochar and food, to attempt an eradication at this point. It is too little, too late. A more productive use of energy would be to plant ohia trees and reestablish ohia forest on old sugarcane land and monitor new plantings for invasive species, with roadsides especially, monitored before invasives become established.

Thank you,



Jackie Prell

P.O. Box 1380

Pahoa, HI 96778



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jackie Prell
P.O. Box 1380
Pahoa, HI 96778

Dear Ms. Prell:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 8, 2010, on the Draft EA expressing your recommendation of the No Action alternative. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about strawberry guava's place in Hawai'i's environment, please see FAQ No. 1. Regarding your comment about the uses of strawberry guava, see No. 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Project is costly and unnecessary

As mentioned above, please see FAQ No. 1, but we would also like to address the idea of who decides the relative value and desirability of native versus invasive species. Beginning before the first arrival of humans in Hawai'i, the islands have had a unique flora: approximately 1,000 species of flowering plants, about 90% of which could be found nowhere else on earth. Ancient Hawaiians brought a variety of common Polynesian plants to the islands, however introduction of new species has increased greatly in the last 200 years, with perhaps 8,000 species now in cultivation. The great majority of introduced plants do not pose any problems in Hawai'i. Unfortunately, some plants do escape from gardens or other urban and rural settings and are able to establish vigorous, spreading populations in our natural environment. These are the species that are considered invasive, and the most aggressive among these are recognized as serious threats to the well-being of people and the environment. Many of the laws, policies and regulations of the State of Hawai'i and the United States of America expressly address preservation of our unique native plant species and ecosystems as well as management of invasive species to prevent additional damage to our natural environment and the benefits we receive from healthy ecosystems.

2. Discrepancy regarding availability of fruit and wood.

As mentioned above, please see FAQ No. 8. Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

3. Discrepancies regarding travel within the forest.

Based on our experience, foot travel becomes considerably easier in areas where densely growing invasives such as faya tree and lantana have been removed or reduced by either biocontrol or manual cutting. We have similar expectations for strawberry guava biocontrol, although results will probably vary. This will be one of the goals of monitoring. Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

4. The Department of Agriculture should instead find productive uses for strawberry guava.

There are some existing productive uses for strawberry guava wood that will not be affected in any way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

The EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. It should be noted that even after introduction of the scale insect, stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. Fruiting will be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

**Comments Regarding “DRAFT ENVIRONMENTAL ASSESSMENT:
Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation
of Native Forests in the Hawaiian Islands”**

I am an assistant professor of Geography and Environmental Studies at UH Hilo, and my primary research for over 10 years has been to map native Hawaiian species and their habitats. This experience has shown me that the biodiversity crisis faced by Hawaiian ecosystems is extremely grave and is far more serious than the general public realizes. Unfortunately, I feel that the present state of our biodiversity has not been as prominent as necessary in the public dialogue. It is difficult for the public to relate to species that are now so rare that few people ever see them. Five years ago, the Po’o Uli, a very unique bird species, went extinct on Maui. There were no protests, little public outcry, and in fact many people were completely unaware that this tragedy had occurred (including my own father who lived just a few miles from where the last Po’o Uli perished). On average over the last century, one unique bird species has gone extinct every 10 years. Many birds once common in Hilo are now endangered and restricted to remote areas, and as a consequence the general public is unfamiliar with them. Over 100 plant species have gone extinct over the last century (many of them formerly living in areas now completely dominated by strawberry guava), another 100 have fewer than 100 individuals left in the wild, and a large proportion of the remaining species are rare or endangered. My experience has also shown me that strawberry guava is, and will increasingly be, a major contributor to this crisis. Biocontrol of strawberry guava cannot be considered outside this context. In considering this, I do have some comments pertaining to this Draft Environmental Assessment, which I have itemized.

Abundance of Strawberry Guava

While the distribution and abundance of are generally well known, a number of details pertaining to our knowledge (or lack thereof) should be more detailed. (Disclosure: I provided maps and analyses to the writers of the EA upon request,

however more detail is probably needed in the methods). These maps made use of a satellite-derived landcover map produced for the HIGAP project. While this classification has limited precision, it is generally accurate in separating native from non-native dominated vegetation. Landcover (vegetation) is categorized as a function vegetation structure (i.e. forest, shubland, grassland, etc.) and of so-called dominant species. Dominant species as defined for these maps are those species that make up the greatest amount of cover when viewed from above by the satellite. Those vegetation types that are likely to be at least partially dominated by strawberry guava (estimated to be at least 10% cover). However numerous areas that are shown in the maps as “potentially” invaded are certainly already in a grave state of invasion by strawberry guava. In many areas an overstory of native Ohia, masks thickets of strawberry guava, such that satellite imagery cannot detect the invasion. In these areas, the diverse understory typical of native forests has long been displaced and strawberry guava has essentially shut down reproduction of Ohia, such that for all intents and purposes, the invasion is complete despite appearing to be healthy nativeforest. For example, the Laupahoehoe Forest Reserve and Natural Area Reserve, appear to be only “potentially invaded”, but detailed ground surveys by various agencies demonstrate that strawberry guava is extremely dense at lower elevations. Therefore, it is important to assert that these maps and estimates are certainly inaccurate in the sense that they are underestimates of strawberry guavas extent.

Negative Impacts of Strawberry Guava

Despite the many impacts listed in the Draft Environmental assessment, there are several points that could be expanded. Due to strawberry guava’s tendency to form thickets, even in the understory of what appears to be native forest, it has an extreme capacity to disrupt natural vegetation due to the unique structure of Hawaiian forests. A large majority of Hawaiian plant species (and especially endangered species) are either shrubs or small trees, such that strawberry guava directly displaces them even in areas with some degree of Koa or Ohia overstory. The smooth bark of strawberry guava does not permit the growth

of epiphytes, which are abundant on the tree ferns and other species typical of native understory. Since many species (including Ohia) often start out as epiphytes on tree ferns or fallen trees, the disruption and displacement imposed by strawberry guava likely creates a “generational shutdown” whereby old Ohia are alone in a forest with no offspring.

Feral Pigs

The relationship between feral pigs and strawberry guava could be better characterized. While pigs do forage on the fruit of strawberry guava, this is heavily concentrated at one time of year (late summer and fall); therefore areas with the highest densities of strawberry guava (and therefore low densities of other plant-based forage) may represent a limited, seasonal food source relative to more diverse communities with a variety of forage. Furthermore, considering the extremely omnivorous diet of feral pigs, it is highly unlikely that the loss of a single food item would result in a reduced pig population. Indeed dense feral pig populations can be found at higher elevations in Hawaii (where there is little strawberry guava), as well as a diversity of vegetation types globally. Therefore not only is a reduction of strawberry guava unlikely to reduce feral pig populations, it is probably misguided to state that reduction of pig populations as an indirect benefit of biocontrol, particularly considering the perceived loss of resources by the hunting community. Other more area-specific methods of control of feral animals are more likely to be effective and moreover on reduce or remove feral pigs from non-hunting areas.

Damage to Private Property

One of the major contentions in opposition to biocontrol surrounds the assertion that predation on strawberry guava by *T. ovatus* constitutes damage to private property. Several different reasons support why this is not the case. First and foremost is the clear evidence that *T. ovatus* does not kill strawberry guava trees. Without killing trees, the most damage that can be expected is some disfigurement of the leaves and a reduction in fruit production. In the case of damaged leaves, this would not be clearly visible (except by close inspection) in an

overwhelming majority of strawberry guava on private property, which are not growing in the immediate vicinity of homes but instead are on less-managed portions of properties. Moreover, in those *very few cases* where strawberry guava is a highly visible, closely maintained part of landscaping, there are simple ways to reduce the impacts of *T. ovatus* (as noted in the draft EA). Contentions that the release would result in deforestation, “dying trees”, buildup of dead wood constituting a fire hazard, and other claims fly in the face of clear evidence. More importantly however, is the idea that any damage to strawberry guava on private land represents some sort of economic damage that demands compensation (lawsuits pertaining to cases of crop damage in Florida will inevitably be cited by opponents). However on the *overwhelming majority of properties*, strawberry guava has not been actively planted, fertilized, pruned, nurtured or otherwise cultivated. Instead it is growing wild, having had no economic input or human effort invested in its existence. Wild plants and animals have an established precedent of management by government agencies, even on private property. The endangered species act, various wildlife management laws, and numerous regulations, including those governing noxious weeds, clearly indicate that just because a species resides on your property does not mean that you “own” it. A clear boundary must be maintained between cultivated/domestic organisms (for which individuals have clear rights) and those organisms that occur in a wild condition if ecosystem health and biodiversity (societal values that have been deliberated and legislated) is to be maintained.

Community Perception vs. Scientific Evidence

A staggering misconception in the community is that strawberry guava will be somehow “eradicated”; if there was any scientific evidence to support this, I would probably also have concerns. Other concerns that defy logic abound: fire hazards in a very wet climate, sudden evolution of the biocontrol agent (even though no such thing has been documented among the many introduced organisms), and loss of a critical food resource (an extremely tiny percentage of strawberry guava fruit is consumed by humans). The shear magnitude of

outrageous claims, rumor-based assertions, science taken out of context, and fear mongering has created a fog of suspicion that science and reason seem unable to pierce. Nonetheless public policy must be based on what experienced professionals determine to be the most likely outcomes, not what the public fears outcomes may be.

Closing Comments

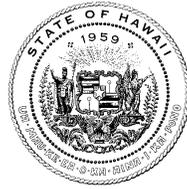
This issue should be framed in terms of weighing the probability of the risks associated with different actions and making the best decision based on all available information. On the one hand is biocontrol, which arguably has a certain amount of risk. However, 15 years of research suggests that the likelihood of the worst outcomes is low. On the other hand is the present state of our ecosystem. In short, unlike biocontrol, our present situation and our present level of effort and ability in dealing with the problem have a very high probability of dire outcomes.

Sincerely,

A handwritten signature in black ink, appearing to read "Jonathan Price". The signature is written in a cursive style with a large, looping initial "J".

Jonathan Price, Ph.D.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jonathan Price, Ph.D.

Dear Dr. Price:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. The threats posed by strawberry guava are indeed very real. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

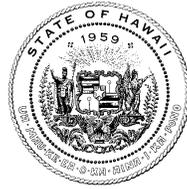
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I am writing in support of biocontrol in response to the Strawberry Guava infestation. Please follow the prescribed alternative of biocontrol release.

Mahalo
M .SC. Noelani Puniwai
PO Box 467 Kurtistown, HI 96760

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Noelani Puniwai, MSc
P.O. Box 467
Kurtistown, HI 96760

Dear Ms. Puniwai:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

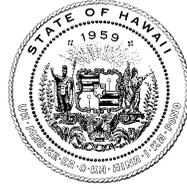
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I am writing to support the release of a scale insect to control strawberry guava. I live on the big island and enjoy the native forests here. Without biocontrol, these forests will likely be overtaken by strawberry guava. I am also concerned about the effect of fruit flies on our local agricultural industry. I think targeted control of guava with the scale insect combined with removal of trees is necessary. Thank you for recording my comments.

Sincerely,
Erin Questad
Kamuela, HI

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Erin Questad
Kamuela, HI

Dear Dr. Questad:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

"Mary Quijano R(s) "

Dear sirs,

The plans to introduce an alien insect species into a fragile ecosystem to control strawberry guava trees is a frightening assessment, not just of what the release of this insect might cause to the people and the environment, but also of the mindset, intractability and hypocrisy of Government funded environmental scientists. How can these scientists and bureaucrats justify the protection of one species of introduced guava - the yellow guava - and attack another? Are not both species equally 'introduced', and equally invasive? And if this scale insect is specific to guava trees, won't it go ahead and attack the yellow guava as well eventually? Very very few insects are such specialists that they will only infest one particular species of plant, as this is not pro-survival: if they kill off all their "prey" they die as well.

As a matter of fact, have these scientists considered what will happen if they are "successful" in eradicating the strawberry guava completely? Do they expect that the billions of members of this alien insect species that have no natural predators here will simply die off and disappear as well? Or will they mutate, change, adapt (as is the governing rule of survival in nature) to find another host? Perhaps a native tree such as Ohia?

Study of insect behavior over a short term in a controlled lab setting is in no ways indicative of how it will behave, adapt and change over time in the wild.

Even as those of us with such foresight write letters to those in charge begging them to do more studies, take another look, consider all possible outcomes, it is like pushing a boulder uphill against the downward hostile pressures from ivory tower scientists whose smug arrogance regarding their own infallibility, and their chronic and habitual lack of foresight due to self-aggrandizing blinders, has led to one ecological disaster after another.

Please please take another look, do more intensive studies, don't be in such a rush. Once you release this insect it will be too late to take it back should it prove to be like the rabbits in Australia or the BP oil spill in the gulf. Err on the side of caution for once!

Mary Quijano R(s)
15-2784 Ono St
Pahoa, Hawaii 96778

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mary Quijano
Pahoa, Hawai'i

Dear Ms. Quijano:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 27, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the adverse effects of strawberry guava, the threat from the scale insect and its testing, please see FAQ Nos. 1, 5, and 6, respectively. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. *Will Tectococcus ovatus attack common guava as well?*

Extensive laboratory testing in Brazil, Hawai'i and Florida found no impact on common guava from the scale insect. The evidence also includes more than 15 years of observations of the insect populations developing on strawberry guava in close proximity to common guava trees at field sites in Brazil. A review of Brazilian literature on pests of common guava showed no mention of the scale insect or any other gall-forming homopterans (scale insects, aphids and relatives) (pp. 37-38).

Finally, we would like to reiterate that the testing done was extremely thorough, in keeping with modern biocontrol efforts in Hawai'i that have had remarkable successes and no significantly adverse side effects in over 30 years. Introduction of rabbits in Australia, the 19th century introduction of the mongoose to Hawai'i, and the BP oil spill are not comparable to carefully thought-out and researched biocontrol introductions such as this one.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

The strawberry guava is a major problem on Hawaii Island and it needs to be addressed. There will always be enough of this invasive species to supply the very limited number of people who use the fruit.

We recommend approval of the bio-control program.

James E. Quinn
Hawaii Island Hardwoods LLC

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

James E. Quinn
Hawai'i Island Hardwoods LLC

Dear Mr. Quinn:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Neil Reimer
Hawai'i State Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Re: Biocontrol of Strawberry Guava by its Natural Control Agent for
Preservation of Native Forests in the Hawaiian Islands

Dear Dr. Reimer,

I am writing in strong support of the proposal to release on state
lands *Tectococcus ovatus* for biological control of strawberry
guava, *Psidium cattleianum*. Strawberry guava is one of the very worst
weeds in the state and must be destroyed before it can consume
additional tracks of native forest lands.

Thank you for considering my testimony.

Sincerely,

Tom A. Ranker, Chair
University of Hawai'i at Manoa
Department of Botany
3190 Maile Way, Room 101
Honolulu, HI 96822

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Tom A. Ranker, Chair
University of Hawai'i at Manoa
Department of Botany
3190 Maile Way, Room 101
Honolulu, HI 96822

Dear Dr. Ranker:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 11, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I work in Natural Resource Mgmt in Hawaii, and I grew up on Kauai. I have had the opportunity to hike and work in many native forests across the islands, and in my short lifetime I have seen strawberry guava take over. I am writing to show my support for the biocontrol release before it is too late!!! I think it is the only viable option for controlling strawberry guava, and something definitely needs to be done.

Thank you,
Mataia Reeves

--

Mataia Reeves
University of Hawaii at Manoa
Dept. of Natural Resources and
Environmental Management

Email: mataia@hawaii.edu
Phone: (808) 346-0746

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mataia Reeves
University of Hawai'i at Manoa
Dept. of Natural Resources and
Environmental Management

Dear Ms. Reeves:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dear Sir:

I support the control of the invasive strawberry guava by means of a biological control. I was shocked to see the density of strawberry guava trees in the watershed area of the big island (pictorially). Maui has some densities of it, and I suspect other islands do as well. This tree will destroy the water shed areas by limiting the understory ferns and mosses, and compete with native trees for sites, water, light, etc. We need our water more than we need the strawberry guava.

I understand that the hunters want the guava maintained to support a pig population. There will still be pigs and we have too many at the present time. Furthermore the deer population is out of control and needs to be reduced in numbers. So hunting will continue.

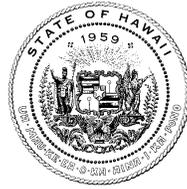
The tree is a good source of fruit for making jellies. As I understand it the scale weakens the trees and reduces the fruit production. So homeowners will still have the fruit for jellies. If the scale is a problem, an oil (during non fruiting time) will control it.

To me the biological control of strawberry guava is a win win situation. Thank you for this opportunity to write on behalf of controlling the invasive strawberry guava.

Ernest H. Rezens, Professor Emeritus Agriculture, University of Hawaii Maui College
ISA, Certified Arborist WE2135A
ASCA, Registered Consulting Arborist 380

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Ernest H. Rezens
University of Hawai'i Maui College

Dear Professor Rezens:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 22nd 2010
P.O. Box 1225
Hawaii HI 96749

Dear Strawberry Guava (S.G.) Bio Control Reviewers:

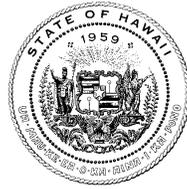
It is my understanding that the S.G. has been on the "Big Island" since 1825. How would each year of delay in initiating the "Scale" approach to effect the vitality of the S.G. translate into loss of viable stands of Ohia acreage in the most critical preservation zone(s).

Although many years of research have been conducted on this Bio. Control approach, my risk averse nature interprets this "deadline" for submission of input as ~~the~~ "rush to release". Two of my lingering concerns follow.

① What would be an acceptable level of encroachment by other invasive species that might fill a void left by a weakened S.G. population? It seems to this more casual contemplator that data derived from field trials involving the physical manipulation of existing S.G. to simulate various levels of competitive pressure on the Ohia would be relevant enough to justify the additional delay and costs incurred.

② Given the tendency of "sucking insects" to develop symbiotic (mutualistic) associations with ant species(s), what naturalized ants might assume that role? If the probability of such a relationship developing is significant then concerns about the broader ecological ramifications are relevant.

Unfortunately, I have not yet availed myself of the opportunity to read the environmental assessment of this S.G. bio control report. However, I do appreciate your time invested in all aspects of this program including your reading of the above comments, and concerns about one invasive species (S.G.) being controlled by the irreversible release of a scale insect, while so many other species remain and spread. Sincerely,
P.O.



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Richard
P.O. Box 1225
Keaau, HI 96749

Dear Richard:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comment about the role of strawberry guava in the Hawaiian environment, please see FAQ No. 1. Regarding your concerns about biocontrol, please see FAQ Nos. 3 and 6. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Removing strawberry guava invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

2. Would alien ant species associate with the scale insect?

Not all scale insects produce honeydew, which commonly attracts alien ants in Hawai'i and further contributes to invasive pest problems. *Tectococcus ovatus* remains enclosed in a gall for most of its life and does not produce honeydew. No association with ants has ever been observed for this insect in its native range.

3. *The action will be irreversible.*

Although it is not yet certain that *T. ovatus* will survive and effectively inhabit strawberry guava forests in Hawai‘i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

Aloha,

I know I'm a day late, (computer issues) but I'm against getting rid of our Strawberry Guava. I am a born and raised citizen of Kaua'i and I have been brought up using this resource as food. In the event of not being able to obtain store bought food, I know that I won't starve knowing I can go to the mountains and use this guava as a resource.

I understand wanting to protect our native plants but I'm sure there's other ways to do it. If all our food sources fail from the mainland, we can't eat our native plants.

How about getting rid of the REAL PEST such as the CAT CLAW or other weeds that don't produce fruit?

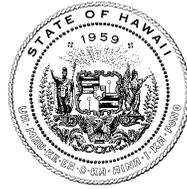
I thank you for hearing me and hope you put my comments into consideration.

Mahalo,

Amber Rivera

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Amber Rivera

Dear Ms. Rivera:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 24, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect's impact on fruiting, please see FAQ No. 2. Regarding biocontrol efforts for other species such as cat's claw, see FAQ No. 8. Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 5, 2010

DR. Neal Rimer,

I am a Resident of the Big Island 65 years old, and I strongly oppose the biological control of the Strawberry quinus. I am a Rancher in Glenwood, and have enjoyed the Strawberry quinus using it for several purposes. Firewood, fruit for home made jelly, and it is a vital supply for food for many birds, and animals.

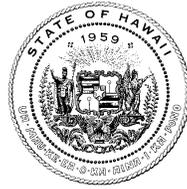
This bio control would do damages to my personal property and it is an irreversible process. The Rose apple trees have been destroyed throughout the state. It is an eyesore and a mess. Before the bio control of the Strawberry quinus is done a full environmental impact statement must be done.

I appreciate your serious concern on this matter.

D.B.D. Ranch

Sincerely,
Danny Rocha

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Danny Rocha
DBD Ranch
P.O. Box 338
Mountain View, HI 96771

Dear Mr. Rocha:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 5, 2010, on the Draft EA expressing your opposition to the biocontrol release. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about a reduction in fruit, please see FAQ Nos. 8 and 10. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

2. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai‘i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

3. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive, flowing style.

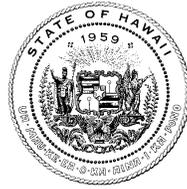
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

I am very much in favor of beginning extensive strawberry guava biocontrol here on Maui.

Lee Rosner
PO Box 1157
Haiku, HI 96708

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Lee Rosner
P.O. Box 1157
Haiku, HI 96708

Dear Mr. Rosner:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 16, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable. Following a period of initial release and monitoring at selected sites on Hawai'i Island, we expect that the biocontrol agent will be available for management of strawberry guava throughout the state.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

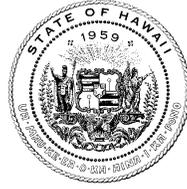
Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I am writing in support of the research and implementation of the biocontrol for strawberry guava. Strawberry guava is spreading quickly through our mid-elevation forests, displacing our embattled native flora and fauna. It will continue to adapt to and invade higher elevations, degrading the last refuges for many of our native species. The decision to implement a biocontrol for strawberry guava should not be delayed - time is critical. Native forest that is highly degraded today will probably be permanently lost as native habitat. Manual control of strawberry guava is impossible in Hawai`i's difficult terrain, and would damage native understory plants, insects and soil, whereas biocontrols work tirelessly and without cost. Biocontrols have been important in battling other invasive plants here, such as prickly pear cactus, lantana, ageratina, and others. No amount of cheap fruit today is worth losing our native wilderness forever.

Brooks Rownd
Hilo, HI

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Brooks Rownd
Hilo, HI

Dear Mr. Rownd:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

P.O. Box 152
Honokaa, Hawaii 96727
Papaloa (808) 94780

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.

Geraldine Sante

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Geraldine Santos
P.O. Box 152
Papaaloa, HI 96780

Dear Ms. Santos:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I would like to take this opportunity to provide comment on the draft Environmental Assessment (EA) for the release of a natural predator (*Tectococcus ovatus*) for the sustainable management of strawberry guava in Hawai'i.

As a conservationist, environmental educator, and life-long resident of Hawai'i, I am in favor of this action to release *Tectococcus ovatus* to control strawberry guava. I have hiked in many a forest throughout the islands over the past 30 years and one non-native plant that is ubiquitous is the strawberry guava. It has, unfortunately, crowded out native plants and changed the ecosystem to no longer be hospitable to native species.

Now we have the opportunity to slow the spread of this plant and give native species a chance to recover. Releasing the insect is a tool we need to be able to utilize. The action has been studied carefully by scientists to ensure that this method of biological control does not backfire. I trust their science and believe that we should move forward on this action to help save Hawaii's native forests, our freshwater supplies, and the health of our land for future generations.

Mahalo for your consideration of my comments.

Pauline Sato
1173 Alewa Drive
Honolulu, HI 96817

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Pauline Sato
1173 Alewa Drive
Honolulu, HI 96817

Dear Ms. Sato:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 19, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is fluid and cursive, with a long horizontal stroke at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Date: 07/22/2010

RE: Strawberry Guava Biocontrol

TO: Hawaii Dept. of Agriculture Plant Pest Control Division

To Whom it May Concern,

I am writing to support the release of the Strawberry Guava biocontrol agent in the State of Hawaii. These are my personal comments but are influenced by over 20 years of professional experience in the field of conservation and in preventing species extinction. In summary, I feel that the use of biocontrol agents as a "last resort" - when an invasive species infestation has spread beyond the control of conventional treatment methods - is our only option. On a daily basis I am exposed to the management of invasive species on the Island of Hawaii, from incipient populations which are eradicable to large populations which are only able to be contained. When populations are small or geographically contained - treatment by herbicides is possible - but at the scale on which Strawberry Guava occurs it would take millions of gallons of herbicides and billions of dollars to simply control the infestation. Because Strawberry Guava not only threatens ESA (Endangered Species Act) listed species with possible extinction, but also threatens human livelihoods, I feel that a biocontrol agent is the only option and I thereby give my full support to its use. I think it is very important for agencies and citizens to realize that the alternatives to biocontrol are species extinction (which is not acceptable) and the use of massive amounts of chemical control agents (which is not sustainable or acceptable) - so I see no other option than to implement the biocontrol. If early detection and rapid response are the first line of defense - then biocontrol is the last...and whereas I agree it should be used sparingly I feel that Strawberry Guava is a very clear target for this control method.

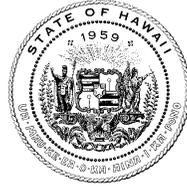
Sincerely,

G. Jan Schipper, Ph.D.
23 East Kawili Street
Hilo, HI 96720

808-333-0262
gjs@hawaii.edu

CC: Hawaii State DLNR Division Forestry and Wildlife
CC: Big Island Invasive Species Committee

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

G. Jan Schipper, Ph.D.
23 E. Kawili St.
Hilo, HI 96720

Dear Dr. Schipper:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

I am writing to express my concern regarding strawberry guava. I am currently working on the Big Island of Hawaii in Laupahoehoe and Hakalau, and have seen the detrimental effects on the forest imposed by strawberry guava. I am a graduate from the University of Hawaii at Manoa, where I earned a degree in natural resource and environmental management, and know from my studies that if something is not done to remedy this invasive specie, the forests of Hawaii are headed towards a scary future. I am in full support of the bio control.

Thank you for your time and consideration,

Sincerely,

Olivia Schubert

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Olivia Schubert

Dear Ms. Schubert:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

2801-N2 La-I Road
Honolulu, HI 96816
July 12, 2010

Hawai'i State Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Ladies and Gentlemen:

I am writing to input my comments on the plan to release *T. ovatus* into the wild as an attempt at biological control of the spread of strawberry guava. I think that this is a miserable idea. My reasons briefly are as follows.

As your attempt to control banana poka has shown, there are always unintended consequences of mucking with nature. You brought in the wrong spores and now other varieties of lilikoi are also being attacked by the rust that was imported. There almost always seem to be unintended consequences when we humans in all our vanity and hubris start mucking with the natural balances.

The strawberry guava is a species that gives good food, fuel and tool wood. We need more wild food species in the Hawaiian Islands, not less. I am a retired college teacher and technologist who has been concentrating on the climate problem for the past several years. I view things, especially human actions and inactions, from their long-term perspective. We are currently crossing tipping points that will radically change human civilization. Your plans and Environmental Impact Studies are all based upon a short-term perspective in the sense that you do not see what the future holds. Imagine a situation where there is no Costco anymore, arguably no cheap fossil fuels (or the human restraint to tax them and their unintended consequences appropriately) to transport container load after container load of cheap frozen foods here from far away. The human populations here will survive or die based upon the productive capabilities of the landscape. A prized and useful species like the strawberry guava is like food in the larder. And the animals that will thrive on the fruits are as well, from our standpoint. Our civilization is based upon cheap and plentiful fossil fuels. Their cost and availability are both subject to change, rapid and radical change as we have seen in the past. Then the oil stops flowing, or when society properly assesses the environmental impact of those carbon fuels and imposes their real costs upon all the 'downstream' products and activities, the local production and availability of food, fuel (biomass) and tool will be critical to our survival. You are considering an action that is bound to have grave and unintended consequences on this increasingly likely future scenario.

Indeed, your entire EIS suffers from a tragic and common flaw. Those individuals and agencies that produced the EIS are hell-bent upon releasing this plant disease (let's call it what it is as the term 'biological control' is quite misleading, subjective and self-serving) and the EIS then amounts to a defense of this intended action. It is not a fair and balanced assessment of what could happen, but rather an assessment colored by your

intentions. And those intentions include downplaying, minimizing and underestimating the risks involved in this intended action.

The limited testing you have done on the effects of *T. ovatus* have been conducted under laboratory conditions, not field conditions where the interplay of natural forces is far different than in some quarantined laboratory. In the wild *T. ovatus* will multiply as all species without predators or natural enemies at any scale (bacterial and viral included), and a large amount of available food (strawberry quava) will do... they will multiply exponentially. They will not conveniently decide to stop this exponential growth, but will attempt to take advantage to other food sources... related tree species. And they will have an advantage of huge numbers and rapid multiplication (on a human time scale) to make that jump. As your EIS notes even some of the native tree species you see to protect are in the family tree of the strawberry guava allowing for the ultimate irony that your introduced pest will eventually (though perhaps not in your lifetime or tenure at these agencies) colonize the very species they are intended to indirectly protect.

Releasing *T. ovatus* is, simply put, a bad idea. The individuals and agencies to which I am addressing this, if you are fair and balanced in your assessment, if you are able to step back from your preconclusions and the necessary momentum that your efforts to date are forcing you... you should cancel this ill advised project, despite the momentum that you have been building up behind it. The individuals pushing this ill-advised idea, were they to be held accountable personally for the risks involved, might make different assessments of those risks. But as the process usually goes, those individuals (even you reading this) are shielded from those risks and in this case, may not even be alive with the consequences I am envisioning are realized.

I do not intend to offend either the individuals or agencies behind this intended project, but in good conscience and concern for future generations, I must characterize it as foolish and shortsighted to the extreme. I truly hope that you will reconsider the plan and cancel the project.

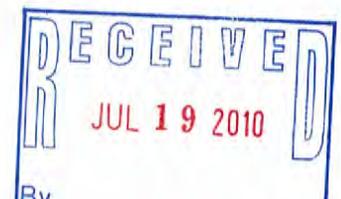
Sincerely,



Stuart Scott

Cc: Hawai'i State DLNR, Division of Forestry and Wildlife

Michael Tsei, Honolulu Star Advertiser





State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Stuart Scott
2801-N2 La-I Rd.
Honolulu, HI 96816

Dear Mr. Scott:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 12, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about biocontrol, please see FAQ Nos. 3 and 5. Regarding your comments on strawberry guava as food for humans and animals, please see Nos. 8 and 10, respectively. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Banana poka/lilikoi is an example of biocontrol gone bad.

There is no documentation of lilikoi in Hawai'i ever being attacked by the biocontrol agent *Septoria passiflorae* that was released to control banana poka. Diseases on lilikoi are caused by generalist pathogens unrelated to the biocontrol.

2. Biocontrol of strawberry guava will have negative impacts on food security.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so. Furthermore, it is unrealistic to suppose that continuing to allow strawberry guava to spread unchecked throughout our state is necessary as insurance against future decreases in imports of food and fuel. Strawberry guava as a resource has minimal value and is largely inaccessible. We agree that Hawai'i does need to increase its independence in energy and food production, but the way to that goal is through preservation of natural ecosystems and investment in island agriculture, both of which are severely threatened by strawberry guava.

3. *The action will be irreversible.*

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai‘i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

4. *The government could be held liable for damages to trees on private property.*

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving an attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of private property rights, there are many instances in which the State must balance the needs of its entire population and the State’s resources as a whole with impacts to private properties. For example, construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai‘i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

aloha,

I am writing to add my name to the list, that wants to save the guava.

I hear about the native birds losing area to live and feed. I have many native Hawaiian birds, and they eat my guava.

I have bees, I hear we have an issue with the bees, same as the birds, with the growing population, these natives are

dying out. so besides this loss, we now have to worry about a bio bug. that may or may not cause havoc on our native trees, wildlife, and our people.

so I wonder why we are even thinking about putting the bio bug in our environment.

I think, this is a matter of "cutting off our nose, despite our face".

I have lived in s. glenwood for 25 yrs, and I do not see guava spreading over the land.

I can not say it better than syd singer, we must not take chances with our eco.

there has to be a better way. lets find and try those first.

this could be another BP, and we say, "oops", when it goes awry.

lets be sure, lets be safe, lets be kind to our aina.

LETS FIND A BETTER WAY, to solve this.

mahalo for your ear.

gloria silva-sampaio

+++++



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Gloria Silva-Sampaio

Dear Ms. Silva-Sampaio:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about strawberry guava and wildlife, please see FAQ No. 10. Regarding the impact the plant has on the Hawaiian environment, please see No. 1. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Comment on June 23, 2010
DRAFT ENVIRONMENTAL ASSESSMENT
Biocontrol of Strawberry Guava
by its Natural Control Agent
for Preservation of Native Forests
in the Hawaiian Islands

Comment by Solomon Singer
Submitted July 17, 2010

To: State of Hawai'i
Department of Agriculture
1428 South King Street
Honolulu, Hawai'i 96814

State of Hawai'i
Department of Land and Natural Resources
1151 Punchbowl Street, Room 131
Honolulu, Hawai'i 96813

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai'i 96721

State of Hawaii
Office of Environmental Quality Control
Kinau Hale
1250 Punchbowl Street
Honolulu, HI 96813

Please find enclosed 330 pages of petitions and comments on this EA submitted by the people of the Big Island. There are approximately 4500 comments opposing this insect release.

I strongly oppose this insect release. In addition to the reasons stated on the petitions and EA comments submitted herein, I would like to add the following.

As climate change alters the Hawaii environment, the native species that dominated the past environment may no longer be able to adapt to the future environment. Forest management needs to plan for the future, and encourage species of plants that will grow well in Hawaii's changing environment. Saving poorly adaptable native species and killing the introduced ones that are better adapted to today's and tomorrow's Hawaii may be the worst thing for the future of our forests.

Save the native species in specialized areas that are fenced and weeded. But let other tree species compete for survival in the world of today and tomorrow, for these may be the survivors of the changes we are encountering. Releasing insects to make trees sick is a sick

idea, and may harm what could be the best adapted species for the future.

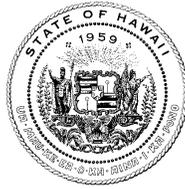
We humans, and even you scientists and government bureaucrats, don't know what the future will bring, except there will be change. Let's prepare for the change by allowing diversity and new forests to develop, instead of trying to poison and infest everything that grows well here.

Yours truly,

A handwritten signature in black ink, appearing to be 'S', written over a circular scribble.

Solomon Singer
P.O. Box 1880
Pahoa, Hawaii 96778
808-935-5563

P.S. I have the original petitions/comments and they are available for inspection upon request. Signers expect individual responses pursuant to HRS 343.



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Solomon Singer
P.O. Box 1880
Pahoa, HI 96778

Dear Mr. Singer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 17, 2010, on the Draft EA expressing your opposition to the biocontrol plan and submitting petitions. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regards to your comments about the role of strawberry guava in the Hawaiian environment, please see FAQ No. 1. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Climate change.

It is short-sighted to describe native species as poorly adapted to climate change. The plants in Hawai'i that biologists call natives were introduced by wind, sea and birds over the course of many millions of years, during which there have been many dramatic episodes of climate change. With or without global warming and other effects from climate change, strawberry guava will remain a threat to native forests and the critical services they provide.

2. Save native species in specialized areas that are fenced and weeded.

We do not believe that it is time yet for this "hospice ecology" approach. For sustainability of natural and human systems over the long term in Hawai'i, commitment to large-scale preservation and restoration of natural ecosystems that have evolved over millions of years is a better approach.

3. Making trees "sick" and "trying to poison" them.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

4. Response to petition signers

Signatures on petitions do not constitute valid comments to an EA meriting a response under Chapter 343, HRS. Our response to the issues on these petitions is contained within this letter and attachment.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Comment on June 23, 2010
DRAFT ENVIRONMENTAL ASSESSMENT
Biocontrol of Strawberry Guava
by its Natural Control Agent
for Preservation of Native Forests
in the Hawaiian Islands

Comment by Sydney Ross Singer
Submitted July 15, 2010

To: State of Hawai'i
Department of Agriculture
1428 South King Street
Honolulu, Hawai'i 96814

State of Hawai'i
Department of Land and Natural Resources
1151 Punchbowl Street, Room 131
Honolulu, Hawai'i 96813

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai'i 96721

State of Hawaii
Office of Environmental Quality Control
Kinau Hale
1250 Punchbowl Street
Honolulu, HI 96813

I am glad to have this opportunity under the environmental laws of Hawaii (HEPA, HRS 343, and HAR 11-200) and the United States (NEPA, 40 CFR 1500-1508) to comment on this **inadequate and highly biased** Environmental Assessment (EA).

An Environmental Impact Statement (EIS) should be required for this strawberry guava biocontrol project.

A. HEPA "Significant Impacts" Require EIS.

There are clearly "significant impacts" from this proposed action, according to HRS 343 and HAR 11-200 criteria. Chapter 11-200-12, Hawai'i Administrative Rules, outlines those factors agencies must consider when determining whether an action has significant effect.

1) *Involves an irrevocable commitment to loss or destruction of any*

natural or cultural resource.

Strawberry guava is a natural resource. According to the DLNR's definition of natural resource, "'Natural resources' means resources such as plants, aquatic life and wildlife, cultural, historic, recreational, geologic, and archeological sites, scenic areas, ecologically significant areas, watersheds, and minerals." (HAR 13-5 proposed rule changes). The EA states that strawberry guava is not a natural resource because it has no natural predators in Hawaii. This is nonsense, and there is no definition of natural resource that excludes non-native species or species with no natural predators.

Strawberry guava is a food and fuel resource, and has landscape and aesthetic value. According to the EA, this value was appreciated and promoted by the government of Hawaii well into the mid-20th century. It is wrong to ignore and deny this species' resource value simply because it has become a weed problem in some forest settings. It still is a resource, and is used and considered as such on private land by private property owners. This was all ignored in the EA.

This statewide infestation of strawberry guava is therefore an irrevocable commitment to the loss or destruction of this natural resource. It is also a cultural resource, being used by native Hawaiian and immigrant cultures in Hawaii for its wood, fruit, beauty and other benefits for 185 years. Evidence of this cultural use is found in the public resistance to this biocontrol proposal, which was also ignored by this EA. There was no mention in the EA that the Hawaii County Council voted on August 2, 2009 to ban this insect as part of a resolution opposing the use of biocontrol against the relatives of the o'hia, including the strawberry guava. There was no mention that Sen. Takamine and Rep. Yamashiro introduced legislation in the Hawaii Senate and House, respectively, to ban the use of biocontrol against food producing plants. There was no mention of the publicized fact that 5345 petitions signatures were gathered to oppose this insect release. This opposition was due to the popularity of this plant, reflecting its cultural resource value.

This proposed release would also violate the Hawaii Constitution, Article XI *CONSERVATION AND DEVELOPMENT OF RESOURCES* **Section 1.** *For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawaii's natural beauty and all natural resources, including land, water, air, minerals and energy sources, and shall promote the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State. All public natural resources are held in trust by the State for the benefit of the people. [Add Const Con 1978 and election Nov 7, 1978]*

Note that the Constitution refers to "all natural resources" and "energy sources". It also encourages "furtherance of the self-sufficiency of the State". Strawberry guava is a renewable energy natural resource, producing wood and fruit that can be converted into ethanol fuel, and which also produces food and grows well in Hawaii. Used and controlled properly, it can help the State achieve self-sufficiency. Infesting it with scale insects deprives the people of this resource, which should be held in trust by the State.

In addition, the release of this insect is irrevocable. The destruction caused by this insect cannot be reversed or halted.

2) *Curtails the range of beneficial uses of the environment.*

Hunters and gatherers will be denied the fruit, which feeds people and game animals. The EA assumes that there will be plenty of fruit despite the scale insect. However, the EA failed to mention the impact of honeybee decline (due to varroa mite and small hive beetle infestation) on overall wild fruit production, and how this would further reduce strawberry guava fruit availability. The cumulative impact of honeybee decline with scale infestation could make strawberry guava fruit rare to find, as flowers go unpollinated, and the trees lose vigor from the galls.

The EA states that the infestation, "(w)ould lead to a 25 to 40 percent reduction in vegetative growth rate and 60 to 90 percent reduction in fruit and seed production, similar to levels seen in its native Brazil." Actually, the loss of fruit and leaves should be higher in Hawaii since there are no predators for this scale insect here as there is in Brazil, and the trees grow in greater density allowing for higher levels of infestation.

In addition, the wood value of these trees will be diminished, since cut trees will not grow back easily if at all, since new leaf growth will be targeted by the scale insect. This means that this renewable wood resource, useful for poles, construction, biofuel, biochar, etc., could become non-renewable, curtailing the range of beneficial uses of the environment.

Further, the potential health impacts from exposure to high numbers of *T. ovatus* airborne eggs, crawling nymphs, and males in high density strawberry guava areas can make the forests unhealthy places, especially for asthma prone individuals and those with allergies to chitin. This would reduce the ability of people to use our forests for recreation.

3) *Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.*

This insect release creates air pollution, which is in conflict with Hawaii's environmental policies and goals. (See below for air pollution discussion.)

This insect release would therefore violate the Hawaii Constitution.

Article IX PUBLIC HEALTH

Section 1. *The State shall provide for the protection and promotion of the public health. [Ren Const Con 1978 and election Nov 7, 1978]*
This insect release threatens latent and uncertain injuries to humans from exposure to airborne insect particles.

It is also in violation of Article IX ENVIRONMENTAL RIGHTS

Section 9. Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources. Any person may enforce this right against any party, public or private, through appropriate legal proceedings, subject to reasonable limitations and regulation as provided by law. [Add Const Con 1978 and election Nov 7, 1978]

4) *Substantially affects the economic or social welfare of the community or state.*

Strawberry guava grows on more than 500,000 acres, according to the EA. Much of it grows on private property, where these plants are valued for their beauty, fruit, wood, and landscape uses. To infest privately owned strawberry guava trees will cause aesthetic damage and will requiring insecticidal spraying to control the scale (which are of limited value on gall-protected insects) or tree replacement with scale resistant species, all of which costs money that the homeowner is expected to pay. There could also be property devaluation as neighborhoods with large numbers of strawberry guava become infested, creating potential health threats and making the area ugly with galled and partially or fully defoliated trees.

The EA mentions that full defoliation is known to occur to infested trees when stressed by other conditions, such as drought. The EA states, "High levels of infestation have been observed to cause leaf drop to the point of complete defoliation of strawberry guava in Brazil." Return of leaf growth will also be impaired by insect attack of new leaves. This means that trees that suffer from drought

and become defoliated may not recover their leaves, and may die. It also means that people using strawberry guava wood and expecting the tree to grow back after cutting may lose their trees, as the new growth is attacked and the trees stay stunted or die.

The exact economic impact has not been addressed in the EA, which it must be. According to the Hawaii Constitution, *Article I EMINENT DOMAIN Section 20*. *Private property shall not be taken or damaged for public use without just compensation. [Am Const Con 1968 and election Nov 5, 1968; ren Const Con 1978 and election Nov 7, 1978]*

Releasing this insect is damaging private property for public use and requires compensation. The EA recognizes this indirectly when it states, "Only when impacts reach significant levels is compensatory mitigation appropriate." The EA assumes that the public will not notice its trees being galled and losing their leaves and fruit. This assumption is not based on facts.

Other facts needed for this EA are how many trees are privately owned and what is the replacement costs for these trees. It should be noted that legal precedent has established that it constitutes "irreparable harm" when there is no plan for compensation of damages. The State must assess the potential damages caused by this insect release and develop a plan for compensation. The State of Florida had such a plan for compensation of homeowners for loss of citrus trees as part of a citrus canker eradication project. As it happened, the compensation was deemed too small, and a class action lawsuit against the government was successful in obtaining full replacement costs for lost trees. Since there were 500,000 trees lost, this amounted to a great deal of money. The State of Hawaii needs to consider the liability it is assuming by damaging strawberry guava trees.

Clearly, this requires an EIS for a full analysis of the economic impacts of damaging these trees.

5) *Substantially affects public health.*

See item 10, below.

6) *Involves substantial secondary impacts, such as population changes or effects on public facilities.*

The infestation of millions of strawberry guava trees on hundreds of thousands of acres clearly can have secondary impacts.

The EA admits that complete defoliation can result from drought, and regrowth will be inhibited by the insect. Complete or partial

defoliation can allow other species to move into the forest as more light is allowed in. The EA admits, "*Other invasive species may benefit if sunlight increases within patches of strawberry guava affected by biocontrol. For example, palm grass (Setaria palmifolia) and other invasive grasses (Andropogon virginicus, Paspalum conjugatum) that flourish in large forest gaps with high light levels may increase within stands of strawberry guava that may be partially defoliated by T. ovatus.*" Other invasive species can also move in, especially at lower elevations where most of the forest consists of invasive species competing for space and sunlight. As the EA admits, "*In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active human intervention.*" This would essentially replace strawberry guava with other non-native species, such as guava, which is considered even more invasive than strawberry guava according to the Hawaii/Pacific Weed Risk Assessment. The forests could therefore be left in worse condition than before the insect release, with increased fire risk and more highly invasive species.

In addition, dead or dying strawberry guava would still have to be removed, and itself creates a fire hazard. The insects will not make the trees disappear. The forests will be ugly, infested with airborne *T. ovatus* insect eggs, crawling nymphs, and flying males.

Reduced fruit will impact on wildlife and hunters and gatherers. While the EA regards impacts on non-native species as insignificant, the public values many of the wild birds, lizards, and mammals that will be negatively impacted by this severe reduction of fruit, especially when the impact of the honeybee decline is factored into the equation. Hunters and gatherers will suffer. Pigs may come onto agricultural lands and into backyards to find food, and may increase their destruction of native species and habitat in search of food substitutes for lost fruit. The EA admits, "*Pigs (Sus scrofa), which feed heavily on strawberry guava fruit when it is in season (Diong 1982), may be forced to find other food sources in the short term and may experience reduced population growth in the long term in areas where their dependence on strawberry guava fruit is currently high.*"

There could be significant secondary impacts on endangered species. The EA states, "*Despite the overall benefit to snail habitat, it is not certain what would occur with individual snails or snail populations that currently are found on strawberry guava plants if the number of these plants is reduced.*" The EA also admits that native birds sometimes feed on strawberry guava. Given the fact that some native species have come to use this naturalized species,

secondary impacts on native and endangered species may occur. The precautionary principle demands that this possibility be considered in an EIS. The burden of proof rests on those proposing this insect release to show that there is no significant impact on endangered species from this release.

7) *Involves a substantial degradation of environmental quality.*

The infestation of millions of strawberry guava trees on hundreds of thousands of acres constitutes substantial environmental degradation. The EA assumes that native species will somehow reclaim the environment once the strawberry guava is infested and loses vigor and fruit, although it admits that low elevations will likely experience an exchange of one invasive species for some other. And the EA states that the actual impact of this release will not be known for decades. In the meantime, we will be left with insect ridden forests, with millions of strawberry guava trees on hundreds of thousands of acres sick and dying, creating air pollution with their airborne eggs, crawling nymphs, and flying males, blighting the landscape, and increasing the fire hazard.

An EIS is needed to fully analyze this degradation of our environment.

8) *Is individually limited but cumulatively has considerable effect upon environment or involves a commitment for larger actions.*

The proposed insect release will not remove the strawberry guava. The EA states that cutting and poisoning of trees will be pursued in association with the infestation. This is a commitment to a larger action with its own set of primary and secondary impacts.

Another commitment to larger actions is the need to manage the replacement of strawberry guava with species that pose a fire risk, as discussed above. Making strawberry guava sick and weak does not solve any problem, but creates new problems to be managed. The environment will undergo a massive transformation, as a dominant species is made sick and other species are allowed to move in randomly. This will require a management response.

9) *Substantially affects a rare, threatened or endangered species, or its habitat.*

The insect will be released in areas with rare, threatened and endangered species. Naturalized species have been known to be utilized by native species. The EA, for example, states, "Native snails are sometimes found on common guava and strawberry guava

trees...it is not certain what would occur with individual snails or snail populations that currently are found on strawberry guava plants if the number of these plants is reduced."

The EA falsely assumes that native species do not require non-native species for their survival, since they existed prior to the introduction of the non-native species. This is naïve. Species adapt to what is available. As introduced species replace native species, survival of other native species requires adaptation to using the newly introduced species. Strawberry guava has been part of the environment for 185 years, and is an important part of the food chain. As a relative of the o'hia, with similar blossoms, it is easy to see how native species could have adapted to using the now ubiquitous strawberry guava. A full EIS analysis of how strawberry guava is utilized by native species is imperative before this insect is released.

10) *Detrimentially affects air or water quality or ambient noise levels.*

This insect creates air pollution, and there must be an analysis of the potential impacts of this pollution on human health and property, in addition to necessary Hawaii Department of Health and EPA permission for this pollution to occur.

HRS §342B-11 states, "**Prohibition.** No person, including any public body, shall engage in any activity which causes air pollution or causes or allows the emission of any regulated air pollutant without first securing approval in writing from the director. [L 1992, c 240, pt of §1]"

HRS 342B definitions state, "Air pollution" means the presence in the outdoor air of substances in quantities and for durations which **may endanger human health or welfare, plant or animal life, or property or which may unreasonably interfere with the comfortable enjoyment of life and property** throughout the State and in such areas of the State as are affected thereby, but excludes all aspects of employer-employee relationships as to health and safety hazards. (Emphasis added.)

"Air pollutant" has the same meaning as in the Clean Air Act, 42 United States Code section 7602 (g), and any substance designated as such by rules adopted under chapter 91.

42 USC 7602 (g) states, 'The term "air pollutant" means any air pollution agent or combination of such agents, including any physical, chemical, **biological**, radioactive (including source

*material, special nuclear material, and byproduct material) substance or matter which is emitted into or **otherwise enters the ambient air.** Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term "air pollutant" is used.'*

It is clear from the above that this insect release would create air pollution that may not only harm human health, but will certainly harm property, i.e., privately owned strawberry guava trees.

The Department of Health may have to develop standards for human exposure to this insect. The EA provides no estimates of how many insect eggs, crawling nymphs, or males may be in the ambient air. The EA states that the particles are small and would therefore pose no risk. This is wrong, since tiny dust mites are highly allergenic, as is chitin, the major constituent of insect exoskeletons.

Given the fact that once released there is no stopping these insects, there could be devastating consequences on human health that would not be mitigatable. The damage to private property from this air pollution is a given, and is admitted by the EA. This entire issue clearly needs to be addressed in an EIS.

11) Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

Strawberry guava grows well along erosion prone areas, such as hillsides, ravines, and roadways. In fact, this species has been selectively planted over the years by landscapers, including those working for the Department of Transportation, to prevent soil erosion. The past EA for this insect release acknowledged strawberry guava is the dominant, if not only, species keeping the soil from eroding in these areas, serving a beneficial function by reducing erosion and keeping the watershed from excessive siltation and sedimentation from run-off.

It is also admitted by the EA that complete defoliation can occur on infested trees at times of stress, such as drought, and leaf regrowth will be hampered by the scale. This means the strawberry guava trees holding down the soil along steep ravines and roadways can become sick and die, with nothing replacing them. This can affect these erosion-prone areas, causing landslides, erosion, watershed pollution from run-off, and road hazards.

12) *Substantially affects scenic vistas and view planes identified in county or state plans or studies.*

The galling of the tree by this insect is expected to result in a 25-40% reduction in foliage, and could be 100% during a drought, with impaired regrowth. Galled leaves are disfigured and ugly, especially on a tree prized in part for its beautiful, smooth, dark green foliage.

The EA states, "*Although individual plants will develop leaf galls...the insect and its effects on strawberry guava are not expected to be noticeable to tourists and the general public.*" This statement is unsupported by facts, and reflects the EA writer's prejudiced view of the public as ignorant of their surroundings.

The reality is that much of our roadways and many neighborhoods are lined with strawberry guava. Infesting these trees will create a blight. Loss of foliage of as little as 10% is considered impairment of the aesthetic value of a tree, according to tree appraisers. (See www.biodamage.com for references). These trees will experience from one fourth to nearly half defoliation under optimal growth conditions, and will be completely denuded from a drought or other stress. The strawberry guava could end up looking like the wiliwili trees that have been attacked by the wiliwili wasp. This will leave our roadways, neighborhoods, and forests looking like blight zones.

13) *Requires substantial energy consumption.*

Strawberry guava is a source of energy. It is a hardwood, and has a favorable btu conversion rate for use as fuel. Releasing this insect will destroy the renewability of this resource by preventing regrowth after cutting, and slowly killing the tree. This loss of energy constitutes energy consumption, as the insect consumes these sources of energy.

B. NEPA "Significant Impacts" EIS Requirements.

14) In addition to HEPA requirements, this action involves the US Forest Service. It must therefore also comply with NEPA. And according to NEPA, an action is considered to have "significant impacts" that require the preparation of an EIS when it involves a degree of controversy and a degree of highly uncertain effects or unique or unknown risks.

Controversy: The release of this insect is highly controversial. There has been a Hawaii County Resolution 80-09, passed in 2009,

banning the release of this insect. There have been two bills introduced into the State House and Senate to oppose this insect release since it attacks food plants. And there have been public protests and over 4500 petition signatures to oppose this insect release. This opposition is to be expected when an ornamental hardwood fruit tree that has been enjoyed in Hawaii for 185 years is threatened with attacked by an alien insect, damaging or destroying everyone's strawberry guava trees.

In addition, there is widespread opposition to the use of biocontrol, which has been known to cause damage to non-target species. The public is wary of biocontrol, especially since this release is experimental, *T. ovatus* has never before been used as a biocontrol agent, unintended consequences have happened in the past, species adapt and evolve over time in unpredictable ways, the benefits are not guaranteed, and once released it is irreversible.

The EA ignored these controversies to its discredit. Any Google search of this issue will reveal widespread public concern and opposition to this release.

Uncertainty: As for having highly uncertain effects or unique or unknown risks, the EA states the impacts of this experiment will not be known for decades. The ultimate impact on strawberry guava spreading is uncertain. What changes will happen to the environment as this experiment proceeds is uncertain. Secondary impacts on the environment, including on native and endangered species, are uncertain. How this attack on a food source will impact on poor populations and hunters and gatherers is uncertain, especially considering the loss of honeybee services due to varroa mite and small hive beetle attacks. How much property damage will be caused by this insect is uncertain. How much personal injury will be caused by the air pollution created by this insect is uncertain. How the public will be compensated for property damage and how much this will cost the State is uncertain. What non-target species this insect will adapt and evolve to attack, and when such attack will occur, are uncertain. And the way to stop the damage caused by this irreversible biocontrol experiment is uncertain.

All biocontrol engenders risks, and for a biocontrol experiment using an insect never before used as a biocontrol agent, on a ubiquitous species never before targeted for biocontrol, the risks are high. To propose that doing this will cause no significant impact is absurd. Clearly, an EIS is needed to examine these risks.

C. Other Considerations.

15) Implicit in HEPA and explicit in NEPA is the need for "objective" analysis of the issues involved in preparing an EA or EIS. For this proposal, the DLNR is the determination agency. However, the DLNR cannot be objective in its analysis, since they have already spent \$50,000 to fund post-release monitoring for this project, as stated in the EA.

This means that the DLNR has already approved and funded part of this project, which should not have been done prior to the completion of an EA and have therefore violated of HRS 343 and HAR 11-200. The DLNR has a conflict of interest and cannot objectively review this EA since their decision has already been made and the project already funded by them. The public cannot expect fair and honest review of this EA by the DLNR, or the DOA, which has also already permitted this release. A disinterested third party should be the determination agency for this EA.

16) According to HRS 343 and HAR 11-200, an EA should be done at the earliest possible time. This EA is being done about 15 years too late, after years of research and grant commitments have been made. This makes an impartial EA impossible. This EA reads like a sales pitch promoting the insect release, as opposed to an unbiased presentation of all the facts, including those which might conflict with the FONSI determination. The fact that this project is already funded and partially permitted prior to this EA puts added pressure on coming up with a FONSI, making the fair evaluation of this EA impossible. This is a fraud.

17) Because of the anti-strawberry guava bias, there was no attempt in the EA to determine the real economic value of the strawberry guava on private property. There was no attempt to find out how many homeowners have strawberry guava on their property, and whether they consider them desirable or a weed. How many acres of strawberry guava are on private lands? How many trees in total are owned by private property owners? What are the values ranges of strawberry guava trees of various sizes and ages, in clumps and individually, as determined by tree appraisers? What would be the replacement cost if these trees are damaged? An EIS should be prepared to assess this liability for the State.

18) The EA assumes that the homeowner will have to bear the financial burden of mitigating the infestation of privately owned plants by either spraying pesticides or replacing the diseased trees. What will this burden cost in total for all the property owners who will be impacted by this insect?

19) The EA insists that this gall infestation will not be ugly. It states, "As illustrated in Figure 2 and discussed below in Section 3.6 in the context of scenic impacts, the leaf galls on strawberry guava are effective at limiting growth and fruiting but are only visible from close-up, leaving a still attractive tree." Actually, the picture in Figure 2 was of a single backyard strawberry guava in Brazil. There were clearly visible galls on the clearly distorted leaves. In addition, Brazil has predators for *T. ovatus*, as the EA describes, so the number of galls on a Brazilian plant would be fewer than on an infested Hawaiian plant. In addition, strawberry guava is admittedly more crowded in number in Hawaii, with large patches. With these infested by the scale insect, there will be a greater density of insects and their airborne nymphs and eggs to land on leaves, making for greater infestation and gall number. The EA example is, therefore, inappropriate and misleading.

20) The EA states, "The subtlety of impact of *T. ovatus* on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property." However, the EA admits, "At the close-up scale (for example, if strawberry guava is used as a potted plant), however, the leaf galls may be perceived as unattractive." The EA adds, "...there may be some decrease in the attractiveness of strawberry guava plants..."

How do you know that residents will be unaware of the galls? Was a study conducted to see how people reacted to the galls and reduced leaf number and fruit number? Keep in mind that the red fruit are also part of the beauty of the tree. Leaves and fruit will be reduced, to what degree is unknown, but could be extreme defoliation and fruit loss under certain conditions known to occur in Hawaii.

21) How will the real estate market react to massive scale insect infestations of strawberry guava, especially in areas with lots of strawberry guava? Will there need to be a disclaimer on a sales contract that the area is subject to a government imposed insect infestation? Realize that strawberry guava is the dominant species in many residential areas.

22) The EA describes greenhouse studies on *T. ovatus* for host specificity. However, the EA fails to mention that conditions in the wild are not the same as in the greenhouse, and conditions in Hawaii Volcanoes National Park, where the greenhouse is located, are not the same as in lower Puna, or Hamakua, or Waimea, or Havi, or Kona, or any numerous other places in the State where the insect will be

infesting. The EA fails to consider the added burden to a tree of being in the wild. Drought, poor soil, inadequate lighting, competition, insect attacks, disease, predators, and more affect wild plants and not those raised under controlled conditions in a greenhouse. Wild plants, including non-target species, are therefore more susceptible than greenhouse plants to infestation and attack by *T. ovatus*.

23) The EA failed to mention in its discussion of evolution of *T. ovatus* to possibly attack non-target species that the studies done on this insect were for one generation only. This does not allow the examination of *T. ovatus*' ability for adaptation to attacking non-target species. Specificity studies should be performed over several years with selection pressure on the insect to try adapting to using new species as a food host. Without this information, statements about the inability for this insect to undergo rapid evolution, as many insects do, are unsubstantiated. Given the amount of time this insect has been studied, such studies could have been preformed.

24) The EA states that exports from Hawaii will not be affected by *T. ovatus* infestation, although it mentions that species of myrtles vulnerable to *T. ovatus* attack exist in Florida and the Caribbean and there could be concern about spreading *T. ovatus* to these places from Hawaii. The EA assumes that current quarantine procedures would apply to this insect. What evidence and facts support that conclusion? As a scale insect protected in a gall, *T. ovatus* may require special treatment. Have infested strawberry guava plants been tested under current quarantine procedures? Will eggs and nymphs, which disperse through the wind, find their way on non-target species that are then shipped out of Hawaii? Could this create a problem that may require changes to export procedures and cause problems to Hawaii agriculture?

25) In this EA, mitigation measures only mention post-release monitoring. Monitoring is studying and researching, not mitigating. What will be done to contain *T. ovatus* if this experiment goes awry and people and desirable non-target species become adversely impacted? What will be the Forest Service, DOA, DLNR, DOH, or other agency responses be to a massive scale insect infestation if it begins to threaten the related o'hia? Will another biocontrol agent be used, or will a pesticide be sprayed? Which ones? Is there funding in place for these responses?

26) The EA failed to discuss the impact of the varroa mite and small hive beetle on feral honeybees and how this will impact of strawberry guava and other wild fruit numbers. It is expected that fruit yield will significantly decline as a result of fewer honeybees, which

achieves the goal of using *T. ovatus*, i.e., lower fruit yield and less spreading through seeds. **The EA should have mentioned this under the No Action alternative**, since not releasing the insect will still result in reduced strawberry guava spread through honeybee decline.

27) This release will adversely impact low income people more than others and violates environmental justice regulations. Reduced fruit from the honeybee crisis will also mean less fruit for people and wildlife. The EA assumes that people will still have strawberry guava fruit after the infestation of the scale, but ignored the added impact of honeybee decline on the fruit supply. While the Forest Service may welcome the decline of the honeybee since it pollinates strawberry guava, the EA must consider this issue in its assessment of cultural and wildlife impacts of the scale. Keep in mind that honeybee decline will also reduce fruit yield for yellow guava, mango, avocado, and other wild fruits. This means that people relying on wild food as part of their diet will be highly impacted by this honeybee decline, which, combined with the scale insect's impact on fruit yield, may make the strawberry guava fruit rare.

28) Under NEPA and HEPA, the EA must address alternatives to the proposed action. The EA only considers NO ACTION as the alternative, and this is inadequate. The strawberry guava is a resource that is being underutilized. The alternative of harvesting the trees was mentioned in the EA in a superficial way with a sham, straw man analysis of the costs of harvesting prepared by Jon Price, a UH biologist and biocontrol proponent. This was a false analogy to the insect release. Removing the trees is not the same as infesting them with galls. Once infested, the diseased trees will still be in the forests and need removal. It is fallacious to compare the costs of complete tree removal from the environment with the costs of infesting these trees and leaving them in the environment. Price's analysis also ignored the resource value of the product and did not adequately consider how selective harvesting might be done in a profitable way.

To truly consider the alternative to infesting the trees the EA should consider the selective (not wholesale) harvesting of trees where they are easily accessible and the wood sold and used for various products, such as wood chips, biochar, and biofuel. The government could encourage the development of a wood products industry in Hawaii that processes numerous tree species, including albesia, guava, and others. Profits can be used to fund mechanical control of strawberry guava and other non-native species in hard to reach forest locations.

In addition to the wood, the EA estimates that the strawberry guava produces millions of tons of fruit each year that mostly goes wasted. This fruit can be used to produce fuel, such as ethanol. Instead of having the goal of destroying the prolific fruit producing ability of this tree, we could be exploiting the fruit as a resource. This would also reduce the fruit fly problem. Trees can be shaken to release the fruit, which can be gathered off the ground. An ethanol production facility could also utilize other excess fruits that are not used for human or animal consumption, such as papaya and guava.

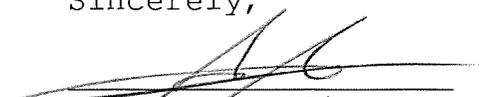
This alternative of using this resource would be sustainable, creating new industry and jobs in Hawaii. The strawberry guava would be controlled in the environment through funding generated by using easily accessible trees as a resource. And private property owners who value their trees would not be damaged by this insect release, eliminating the conflict with the public that now exists over this biocontrol project. This alternative should be given a fair and competent review by experts who are not invested in or committed to using biocontrol.

29) Article XI, Section 9 of the Hawaii Constitution states,
"ENVIRONMENTAL RIGHTS

Section 9. Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources. Any person may enforce this right against any party, public or private, through appropriate legal proceedings, subject to reasonable limitations and regulation as provided by law. [Add Const Con 1978 and election Nov 7, 1978]"

If an EIS is not done to analyze the above concerns, the public can be expected to exercise its Constitutional Environmental Rights.

Sincerely,



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808-935-5563

7/15/2010
Date



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Sydney Ross Singer
P.O. Box 1880
Pahoa, HI 96778

Dear Mr. Singer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 15, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses, which include answers to many of the questions and comments you raised. However, as you have expressed concern about this project for some time, we have elaborated on some of these responses below. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

A. An EIS is required.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects. We do not concur with your opinion that the EA was in any way biased. Under statute and policy, the State of Hawai'i has been directed to implement management of invasive species that threaten the integrity of our natural and cultural resources.

1. Irrevocable commitments.....

We do not concur that strawberry guava is a valuable natural resource. It is an invasive plant that in its current state does far more harm than good and is not in balance with its environment. The EA does not state that "strawberry guava is not a natural resource because it has no predators in Hawai'i" as you claim. The current value of the fruit and wood and green leaves in the landscape comes at a terrible price to the native organisms and the cultural values associated with native forest ecosystems of Hawai'i. Your statement about those values of strawberry guava being ignored in the EA is untrue, as even a cursory review of the EA would reveal.

We do not concur with your evaluation of strawberry guava being a feasible source for ethanol fuel in Hawai'i. While your assertion of this value is not backed up by any data or analysis, the EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. Although the EA did not directly address potential use of harvested fruit as an ethanol source, this use would face similar limitation because of the difficulty of access to infestations away from roads. It should be noted that even after introduction of the scale insect, stands of strawberry guava adjacent to roads

will still be accessible and may, if desired, be harvested for biomass purposes. The biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, and any party interested in using strawberry guava fruit or wood will continue to be free to do so.

2. Curtailment of Beneficial Uses

Fruiting will simply be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

While it is true that recently arrived parasites and predators are causing decline of honeybee populations across the state, and this decline is expected to strongly impact pollination of certain fruit trees, strawberry guava is not likely to be substantially affected because guavas are typically pollinated by a variety of generalist flower visitors, including flies and beetles.

We do not concur with your conclusion that the EA underestimates expected impacts of the biocontrol in Hawai‘i. Reduction in vegetative growth due to *T. ovatus* was measured in Brazil in cages which excluded natural enemies of the scale insect. Impact on fruiting was estimated on trees at a site where natural enemies were not likely to be abundant. Impacts of *T. ovatus* vary considerably from site to site and even tree to tree in Brazil, probably due to a variety of effects (including natural enemies and relative timing of insect dispersal and tree growth). Observations of maximally infested trees are the basis for conclusions on expected impacts of this biocontrol. Maximum impacts of the scale insect observed in Brazil, at the level of 90% fruit reduction, are not likely to be exceeded in Hawai‘i because this level of impact is associated with very dense galling of leaves affecting almost all foliage on a plant. Dynamics of infestation may differ somewhat between individual trees and dense thickets of strawberry guava in Hawai‘i, but maximum levels of leaf galling are expected to develop in both situations over time. The end result in either case is plants with crowns of foliage in which most leaves have numerous galls.

It is true that the biocontrol can be expected to impact the regrowth of strawberry guava from cut stems, and indeed this is hopeful as a mechanism to reduce its competitive ability and assist in restoring currently infested areas with more desirable plant species. The value of strawberry guava as a resource to be repeatedly cut and regrown at a particular location for various uses can be expected to diminish over time in the presence of this biocontrol. However given the extremely limited levels of current use of strawberry guava wood and its great abundance in the environment, reduced regrowth of cut stems is not at all likely to constitute a significant curtailment of use for the foreseeable future. As noted in the EA, large scale harvest of strawberry guava for beneficial use has not been attempted to date and is not likely in the future because of the high effort required and low value of the return.

Your concerns about masses of airborne eggs, crawling nymphs, and male scale insects infesting the forests and making them unhealthy places are unfounded. There are thousands of species of insects at various stages of growth already present in Hawaiian forests, and *T. ovatus* would be no more prevalent than these. Life stages of *T. ovatus* are barely noticeable outside galls in Brazil, even in situations of high gall density.

3. Conflicts with State policies....

We do not concur with your statement concerning airborne insect particles creating air pollution (see response in items 2 and 10).

4. Substantially affects the economic or social welfare of the community....

As stated earlier in this response, and repeatedly in the EA, the scale insect will not severely defoliate strawberry guava trees, any more than native insects on ‘ōhi‘a severely defoliate that tree.

Your concern about defoliation during drought mentions the possibility, acknowledged in the EA, that strawberry guavas with the scale insect may experience defoliation under severe drought conditions. However, such an effect is likely to be temporary, with trees recovering as rainfall returns. Your conclusion that trees are unlikely to recover subsequently is incorrect because, if it did occur, defoliation would strongly impact populations of the insect as galled leaves dropped to the ground. Reproductive females in these leaves would die and subsequent colonization of new leaves by offspring would be slowed, requiring a gradual return to high levels over several generations. An understanding of the biology of *T. ovatus* is important here: The insects disperse not by directed flight, but by crawling and random dispersal of eggs and young nymphs by air currents. Therefore their ability to colonize an available resource is limited and necessarily gradual.

The economic value of strawberry guava is very modest and is mainly associated with the free and casual gathering of fruit and use of wood for poles. These uses will continue unabated and will be affected only marginally, because, as stated above, the biocontrol agent will not eliminate strawberry guava, but simply reduce its ability to compete with native plants. Commercial and some home users of strawberry guava may wish to employ horticultural techniques that will discourage the insect (isolated plantings, horticultural oils, etc.) and maintain fruiting. As stated above, there is an already existing and enormous reservoir of wood that will not be affected. We do not concur that there will be any serious economic harm to any party.

5. Substantially affects public health.

See our response to Item 10, below.

6. Secondary impacts....

Regarding secondary scenic impacts related to drought, any potential defoliation is expected to be temporary, with subsequent recovery of strawberry guava as explained above. Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. However, rapid wholesale replacement of extensive strawberry guava patches by these alien species is not likely because the impacts of biocontrol on standing trees are not severe. In fact, biocontrol as a tool for managing strawberry guava is expected to be a key factor making active restoration of badly degraded lowland forests possible. In native forests at higher elevation, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41). We do not concur that this action would inevitably leave such forests in worse ecological shape.

“Secondary” impacts to those gathering fruit or wood are dealt with above. Impacts to non-native animals such as lizards and non-native birds, if there are any, must be balanced against the highly beneficial impacts to native species that virtually all ecologists in Hawai‘i envision will occur.

As for native snails, they eat the fungus off ‘ōhi‘a leaves; any action that helps maintain a healthy ‘ōhi‘a forest would likely be beneficial to native snails, including those that are endangered. Native snails are sometimes found on common guava and strawberry guava trees, but these plants are not essential to snail conservation. Malacologists concerned with snail habitat and survival in Hawai‘i concur with statement in the EA by Dr. Daniel Chung, former Nature Conservancy and Bishop Museum biologist, that “strawberry guava leaf litter also is extremely poor habitat for the native terrestrial snail species. Wherever strawberry guava has spread, the native terrestrial snails have declined or died out.” Strawberry guava is specifically noted as a threat to native snail populations because it degrades their native forest habitat (Hawai‘i Comprehensive Wildlife Strategy 2005).

As noted in the EA, wild pigs do make use of strawberry guava seasonally, but studies of feral pig diets in Hawai‘i have found that other plant materials make up most of their diet. The varied diet includes a significant consumption (over 50 percent) of ferns and grasses, as well as earthworms and carrion for protein. Because less dense stands of strawberry guava would promote better human access, it might even be possible that hunting success could be increased by the biocontrol action. Without discounting the importance of pigs for subsistence in Hawai‘i, feral pigs are not natives and are generally recognized to be deleterious to native ecosystems. Pigs already reach high densities and cause substantial damage in some forest areas without strawberry guava, so managing pig damage to native ecosystems and adjacent private property remains a significant challenge regardless of the outcome of strawberry guava biocontrol.

7. Involves a substantial degradation of environmental quality

Contrary to your description, we expect that the successful release of the scale insect will result in a substantial increase in environmental quality by preventing strawberry guava invasions from spreading further, allowing native species to better compete, and providing a management tool that aids restoration of invaded forests which are being degraded by strawberry guava. This action will contribute to protecting ecological diversity, watershed values, and cultural resources.

8. Cumulative effect or commitment for larger actions

Plans for post-release monitoring of strawberry guava biocontrol do include a study integrating mechanical control (cutting and stump-herbicide) and biocontrol, however this does not involve a commitment for any future actions. Such studies will simply provide guidance on future actions, including consideration of methods for dispersing the biocontrol agent and combination methods of treatment for certain areas. As noted above and in the EA, the gradual, non-lethal impact of this biocontrol on strawberry guava will not force management actions in response, but rather will provide opportunities for management actions, such as forest restoration or area-wide control of fruit flies, that would not be feasible otherwise.

9. Substantially affects rare, threatened or endangered species...

We disagree with your assessment that reducing the vigor of strawberry guava would harm such species. It is instead clear to the many dozens of biologists who commented on the Draft EA that it would assist in recovering not only rare, threatened and endangered plants, but also invertebrates and birds.

Ornithologists have observed various non-native birds utilizing the fruit, but in general, native birds do not consume it. Strawberry guava thickets provide little to no habitat for Hawai‘i’s remaining native birds. In areas of lower Puna where both strawberry guava and ‘ōhi‘a co-occur, the native ‘Amakihi and ‘Apapane were found to roost and forage almost exclusively in the native forest, while effectively ignoring the guava. In addition, the federally funded Hawai‘i Forest Bird Survey noted a consistent lack of native birds in strawberry guava forests. Dominance by strawberry guava disrupts the close, million-year-old relationships between native trees and native birds. Regarding the Hawaiian hoary bat, while they do feed on insects, the non-native fruit flies and mosquitoes associated with strawberry guava are not prey for Hawaiian hoary bats, which forage on insects that are at least one centimeter in size, such as beetles and termites. Furthermore, these bats would not use strawberry guava thickets as habitat, as they do not enter closed, cluttered forest where they cannot fly. Concerning snails, see our response to Item 6, above.

10. Detrimentially affects air...quality...

There is no evidence that scale insects in any area of the world create air pollution, including the native range of the scale insect on strawberry guava in Brazil. Hawai‘i has thousands of species of insects in its forests, including many types of scale insects, and yet there is no evidence of forest insect-related air pollution. There is no reason to believe that *T. ovatus* will produce air pollution.

Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

11. Affects...an environmentally sensitive area.

Biocontrol is unlikely to increase erosion because impacts on existing stands of strawberry guava will be moderate and gradual. If stands were to decline over time, the gradual nature of the process would allow for replacement with other soil-holding species. Protecting vast areas of native forest from degradation by strawberry guava is the best insurance against erosion since healthy Hawaiian forests are highly resistant to erosion. The forests of Hawai'i are important zones of water input that can be adversely affected by factors promoting soil compaction, erosion, or pollution. In general, ecologists conclude that maintaining the native forest in as pristine a condition as possible helps maximize groundwater recharge and the biota and water quality of Hawaiian streams. Hydrologic studies in Hawaiian forests show that the complex, layered structure of the native forests reduces the impact of rain on surface soils and minimizes the loss of surface soils. Monoculture forests of alien species do not provide this protection, greatly influencing hydrology. In fact, strawberry guava has been found to reduce recharge to the island aquifers compared to native forest.

Forests of eucalyptus on Maui, loblolly pine at Koke'e on Kaua'i, miconia on the Big Island, and strawberry guava statewide exhibit similar structural characteristics: a dense uniform canopy with very little understory. In native Hawaiian forests, the impact of raindrops is buffered by leaves of upper canopy trees such as 'ōhi'a and koa, and then again by leaves of subcanopy trees such as mehame, kopiko, hapu'u and kolea and again by epiphytes, ground ferns, mosses, and layers of decomposing branches and leaves. The forests also help block winds and retard evaporation. That is not the case with the dense stand structure and high foliage biomass of strawberry guava, suggesting that for many decades to come these forests will be diverting water that would otherwise recharge aquifers and streams.

In roadside areas where strawberry guava currently provides erosion control, it will continue to do so, perhaps assisted by other plants (such as uluhe, neneleau and mamaki) that also can colonize open areas.

12. Substantially affects scenic vistas...

The leaf galls produced by the scale insect in Brazil typically do not lead to defoliation or deformities in the tree. The expected impact is not a loss of 25-40% of leaves but rather a reduction in growth (accumulation of height and biomass) of up to 40%. Defoliation would result mainly from an unusual combination of stresses such as prolonged drought, which would also affect most other plants and would be temporary, as described previously. As noted in the EA, the leaf galls on strawberry guava are effective at limiting growth and fruiting but are only visible from close-up, leaving a still attractive tree. The subtlety of impact of *T. ovatus* on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees.

It is worthwhile to note that 'ōhi'a, celebrated for its grace and beauty in Hawaiian songs and chants, exhibits leaf galls produced by a native co-evolved insect without any loss of its general attractiveness or that of its surrounding landscape. It should also be noted that many observers who are appreciative of native species and are concerned about the effects of strawberry guava find the monotypic, uniform foliage of strawberry guava an

unattractive symbol of the devastation of the native forest and in fact would rather see native species such as ‘ōhi‘a on roadsides.

The defoliation levels caused by the invasive gall wasp on wiliwili are extreme and unusual among plant-galling insects and much more severe than impacts expected or observed in Brazil for strawberry guava with the scale insect. This is because the wiliwili gall wasp was both prolific and an extraordinarily efficient disperser, with females able to fly directly to new plants and seek out new areas of fresh growth on each tree in which to deposit their eggs. By comparison, *T. ovatus* disperses slowly and randomly, with large numbers of immature insects dying before they can reach a young leaf and establish a new gall.

13. Requires substantial energy...

As stated above and detailed in the EA, strawberry guava does not appear to be a sustainable source of energy because harvesting and transporting it would consume more energy than it would produce, not to mention lead to other environmental problems.

B. NEPA.

14. NEPA compliance for the project has already occurred. A federal EA was prepared by the USDA Animal and Plant Health Inspection Service (APHIS), which issued a Finding of No Significant Impact on March 13, 2008.

Controversy

While we agree that misunderstanding concerning the actual effects of the project have generated controversy in various circles, the mere presence of controversy alone does not constitute a significant impact under NEPA or State of Hawai‘i law. It is our experience that most people who avail themselves of the studies and other literature generally agree that the proposed action is sound. A substantial majority of commenters at public meetings and to the EA have expressed support for the project.

Some members of the public may be wary about biocontrol in general, but everyone in Hawai‘i benefits from the success of modern biocontrol efforts. They have rid our ranges and hiking areas of excessive growths of lantana and prickly pear cactus, have helped koa forests survive against an onslaught of banana poka, and brought the wiliwili tree back from the brink of extinction.

Uncertainty and irreversibility.

Although it is not yet certain that *T. ovatus* will survive and effectively inhabit strawberry guava forests in Hawai‘i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai‘i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai‘i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai‘i’s endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

C. Other Considerations

15. Objectivity of analysis

We do not concur with your statement concerning the objectivity of agencies to evaluate the EA, nor with your statement that DLNR is already in violation of the HRS Chapter 343.

16. EA at earliest possible time

An EA done 15 years ago would not have contained any information concerning the host specificity of the biocontrol agent, which is the key to evaluating the impacts of the potential release. The EA has been prepared at the appropriate time.

17. Value of strawberry guava

Please see the discussion above related to the economic value of strawberry guava and the very marginal effects of the project on this.

18. Burden on property owners

The trees will not be diseased; instead, they will have a natural predator, just as they do in their home range, and just as 'ōhi'a does. The homeowner will not be required to spray pesticides to continue to derive benefits from existing strawberry guava because trees will not be killed and the galls on leaves are not visible from a distance. Furthermore, because of its limited dispersal ability, the biocontrol insect is unlikely to colonize isolated trees far from forested areas, which may mean that many homeowners will never encounter galled plants. However, in the event that a yard tree is colonized by the insect, horticultural oils may be used to control the insect and help maximize fruit production.

19 and 20. Unsightliness of galls and general attractiveness of tree

Galls are present on many species of trees in Hawai'i, being most noticeable on banyans and 'ōhi'a, but whether these galls make the trees ugly or unsightly is perhaps a matter of opinion. If homeowners particularly desire that strawberry guava trees have abundant red or yellow fruits to add to their beauty, they may choose to protect the trees with horticultural oils and/or grow them in isolation from thickets. As noted above, maximum impacts of the scale insect observed in Brazil (as illustrated in Figure 2) are not likely to be exceeded in Hawai'i because this level of impact is associated with very dense galling of leaves affecting almost all foliage on a plant. Dynamics of infestation may differ somewhat between individual trees and dense thickets of strawberry guava in Hawai'i, but maximum levels of leaf galling are expected to develop in both situations over time. The end results in either case are plants with crowns of foliage such as those illustrated in Figure 2 in which most leaves have numerous galls which are not highly visible unless viewed from close-up.

21. Property values and real estate market

As stated in many places, the presence of biocontrol will not markedly change the appearance of the trees, particularly from the distance that most people would view the trees. While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving a still attractive tree. Complete defoliation is very unusual in Brazil. There is no reason to anticipate devaluation of property, any more than there are real estate disclaimers concerning the galls on banyans, 'ōhi'a, or any of many other species with similar galls.

Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of

private property rights, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably bring increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

22. Applicability of greenhouse studies to real-world conditions

The scientific validity of biocontrol host specificity testing as conducted in the research on *T. ovatus* is well established. Laboratory and greenhouse studies have been found to adequately determine physiological limits of host range for plant-feeding insects in biocontrol research around the world over the past five decades, and in fact typically are conservative in that insects sometimes feed on plants in the lab that they never do in the wild. As noted in the EA, testing of *T. ovatus* was conducted in Brazil and Florida as well as Hawai'i, and in all cases the insect has been observed to be very narrowly host-specific. Furthermore, studies of *T. ovatus* have had the benefit of many years of observation under natural conditions in Brazil, where the insect is only found to exist on strawberry guava and one very close relative.

*23. Evolution of *T. ovatus* to possibly attack other species*

Your assertion that this topic was ignored in the Draft EA is incorrect. Section 3.1.2 discussed the fact that the time scale of evolution is very long; at such time scales, thousands of species of insects have opportunities to evolve such characteristics. Gall-forming insects are actually more constrained in potential for evolutionary shifts than most other insects because of their close interaction and coevolution with their host plants. Experimental protocols for testing this scale insect were in fact rigorous, with insects exposed to a wide variety of plants under varying conditions in tests repeated over several years, and in all cases the results supported the field observations in Brazil that *T. ovatus* is very narrowly adapted for utilizing strawberry guava and not a threat to any other species in Hawai'i.

24. Export restrictions and quarantines

Movement of the scale insect between Hawai'i and Florida would most likely only be possible on live strawberry guava plants with galls, which can be readily detected by visual inspection. Transport of eggs and nymphs on other plant species may be possible, but their establishment in Florida or other destinations is exceedingly unlikely because eggs of *T. ovatus* hatch within a few days and nymphs survive only 1-2 days and can only crawl a short distance before they must find young leaves of a suitable host plant. Quarantine restrictions on the movement of plant material are based on risk, and the risk of *T. ovatus* being transported undetected is minimal.

25. Monitoring may not be enough; what if mitigation is required?

As noted in the EA, although adverse effects on nontarget plant and animal species and vegetation are theoretically possible, the high specificity of *T. ovatus* for strawberry guava and the fact that it only reduces

vigor but does not kill its host plant indicates that adverse direct and secondary effects will not occur. Impacts of *T. ovatus* on nontarget species will be monitored at release sites in native forest plots where density of selected native species will be measured over several years. Releases in experimental plantings of strawberry guava bordered by *P. guajava* will provide demonstrations of specificity of *T. ovatus*. Semiannual reports provided to the Hawai'i Department of Agriculture Plant Quarantine Branch will record all findings regarding nontarget species. Ongoing landscape-level studies of Hawaiian forests such as those called for in *Hawaii's Comprehensive Wildlife Conservation Strategy* will also provide data on the effects of this biocontrol, which are expected to be primarily highly beneficial. All of these data would provide information regarding the need for mitigation of any observed adverse effects, but based on the extensive prerelease investigations and the successful history of biocontrol projects that followed these research protocols, no adverse effects are expected and no additional mitigation measures have been planned.

26. Impact of varroa mite on honeybees and strawberry guava numbers.

While it is true that recently arrived parasites and predators are causing decline of honeybee populations across the state, and this decline is expected to strongly impact pollination of certain fruit trees, strawberry guava is not likely to be substantially affected because guavas are typically pollinated by a variety of generalist flower visitors, including beetles and flies. Wild honeybee populations have declined but have not been eliminated. They are on the rise on O'ahu three years after varroa first arrived and devastated them. Other pollinators have been observed replacing honeybees on certain plants such as kiawe when the honey bee population crashed.

27. Environmental justice.

As discussed above, the action will simply reduce fruiting and growth and will not eliminate either fruit or wood. It is expected that substantial quantities of fruit will still remain, and those who wish to gather or grow strawberry guava will continue to have that opportunity.

28. Alternatives

The Draft EA contained an extensive section on alternatives in Chapter 2. The analysis was not biased. Contrary to your assertion that harvesting of strawberry guava wood or fruit for biomass, woodchips, biochar or biofuel could be profitable enough to subsidize control of non-native species, there are no commercial operations harvesting strawberry guava for such purposes, despite massive infestations that have afflicted landowners and government agencies for decades.

29. Constitutional rights violated in absence of EIS.

We respectfully disagree with your assertion and in fact see the release of *T. ovatus* as the only viable and safe option for Hawai'i to maintain its environmental quality which is being degraded by strawberry guava.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.

Plant Pest Control Branch Chief

Hawai'i Department of Agriculture

To: hdo.ppc@hawaii.gov
CC: paul.j.conry@hawaii.gov
Subject: Draft EA on strawberry guava biocontrol
Date: Thu, 22 Jul 2010 10:39:46 -1000

Aloha -

I am an orchardist in Puna with a nine-acre farm. Two acres are in tangerines. I have stewarded this property since 1979, and done battle with strawberry guava on a nearly daily basis. Even so, it is impossible to keep up with its spread. It has choked out and killed many of my mature tangerine trees because I was unable to get a chain saw or herbicide to it without harming the tangerine. I hand pull about 500 seedlings a day, lop and poison the saplings with Remedy, and girdle and poison the fruiting trees. And it seems like I make no progress at all in controlling this pest, because it reproduces faster than I can eradicate.

I live next door to the Wao Kele O Puna rainforest and have seen it go from a pristine native forest to one where the waiawi has totally taken over the access road and is killing the kopiko, kolea, papala kepau, ohia and hapu'u. There is no question that strawberry guava is killing these native trees, upon which our forest birds depend.

While I am glad that so many people care enough about our environment to be concerned about yet another introduced species, and I acknowledge their concerns, I have read the draft EA and am convinced that it addresses all of those concerns in a most compelling manner.

Some species are generalists and some are specialists. The generalists, like the original finch that pioneered these islands, are able to adapt to a wide range of food sources, habitats and elevations. Eventually, given a suitable habitat to exploit, they stay there, focus on the local resources, and as time goes by co-evolve with those resources and become specialists.

Specialists, on the other hand, are unable to mutate into an advantageous form and reproduce that form quickly enough to survive, should the species with whom they have evolved symbiotically suddenly disappear. Thus, the fear of *T. ovatus* "jumping" to 'ohi'a is more than highly unlikely.

It is a specialist that has co-evolved with strawberry guava over thousands of years, has been studied in its native Brazil, and for more than 15 years in controlled laboratory situations. This is not some uneducated person bringing in a new species without a care for the consequences, as happened long ago (and still happens today with incoming cargo and travellers).

But while *T. ovatus* remains a most unlikely threat to other Myrtaceae, the threat of strawberry guava is "a real and present danger", well documented, and increasing exponentially every day.

We must slow it down or we will lose our forests and birds and end up with a solid thicket of waiawi many miles in extent.

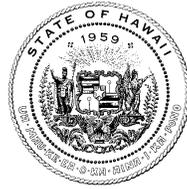
I found the draft EA to be exceedingly thorough and do not believe, as some opponents to biocontrol are calling for, that an EIS would give us any more information than we already have. They are using this excuse to play for time. We cannot afford to give waiawi any more time or the battle will be totally lost forever.

Please approve the draft EA and release T. ovatus. I welcome you to my property, TMK (3)1-5-1-40 to release it.

mahalo,
Rene Siracusa
PO Box 1520
Pahoa, HI 96778

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

René Siracusa
P.O. Box 1520
Pahoa, HI 96778

Dear Ms. Siracusa:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the kind of hard work you have done removing strawberry guava, the proposed biocontrol agent would provide another critical tool for managing this invasive plant and making your efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

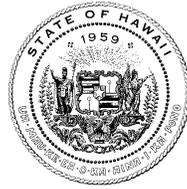
YES to release of *Tectococcus ovatus* to control Strawberry Guava in Hawaii. Save our forrest!

Robert Soares

250 Hao St.

Honolulu, HI 96821+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Robert Soares
250 Hao St.
Honolulu, HI 96821

Dear Mr. Soares:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 24, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 7, 2010

Dr. Neil Reimer
Hawaii State of Agriculture
Plant and Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Dear Mr. Reimer

I am totally against the release of the Bio Control insect of the Brazilian Scale of the Strawberry Guava. Natural agent for preservation, our property rights will be violated and environmental statement should be done. We have been residents of the State of Hawaii, Farmers and Ranchers. We have not had any problem in farming and pasturing, We love the natural preserves, juices and many uses of the strawberry guava in baking and cooking. I beg you to let our voices be heard on this matter. I have an abundance of preserved trees on my properties.

Thank You,



Everette L. Souza

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Everett Souza
P.O. Box 946
Honokaa, HI 96727

Dear Mr. Souza:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 7, 2010, on the Draft EA, in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the effects of biocontrol on fruiting, please see FAQ No. 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

Although you state that strawberry guava has never affected your farming and ranching operations, dozens of farmers and ranchers around the State of Hawai'i have reported otherwise. For many, it is a severe pest that costs them time they could spend farming and money that makes it difficult to subsist and/or make a profit. There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably brings increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

2. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long horizontal stroke at the end.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 23, 2010

D. Neil Reimer
Hawaii State of Agriculture
Plant and Pest Control Branch
1428 S. King St.
Honolulu, Hawaii 96814



Dear Mr. Reimer,

My husband and I are writing to you regarding our opposition and opinion with the release of the biocontrol insect, Brazilian Scale on our Waiawi or Strawberry Guava.

We are agriculture land owners here on the Big Island. This land was handed down to us from generation to generation. When we built our home 11 years ago we decided to keep as much trees and natural vegetation as possible, one of them being the Waiawi. It is always something refreshing to eat while walking our property, something I have made jam with, something we smoke our meat with and a fruit I pick to feed my pigs.

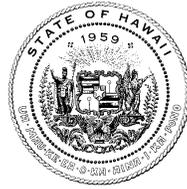
With economy being the way it is we have had to make some changes, we now grow our own vegetables, raise our own chickens for eggs and in some ways live more off the land. We feel it would not be a good thing to destroy this vegetation, not only for us but for all whom depend on it. In one way we feel blessed that we have this natural vegetation.

It would be a great loss if the Waiawi was destroyed.

Sincerely,

Scott & Nancy Souza

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Scott and Nancy Souza

Dear Mr. and Mrs. Souza:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA in which you express your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect's impact on strawberry guava fruit and wood, please see FAQ No. 8. Regarding your comment on strawberry guava's role in the Hawaiian environment, please see FAQ No. 1.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dept of Ag. Plant Pest CONTROL BRANCH

1428 S. KING ST, HONOLULU
HI 96814

Pete Sparks
46-4083 Kapena Rd
Honoka'a, Hawai'i 96727
25 June 2010

Aloha! ~~Editor of Letters!~~

Regarding your recent stories on the release of Tectococcus ovatus to control the invasive strawberry guava, and with apologies to Emily Dickenson, here's how I felt the first time I saw Clermontia kohalae, a native lobeliad, high on the walls of Waipio Valley, struggling to survive in a thicket of exotic ginger:

All my heart became a tear,
All my soul became a tower;
I had never seen a bloom
As I saw that curved deep purple flower.

It was all the little boats
That have ever sailed the sea;
It was all the little books
That had gone to school with me:

On its roots like iron claws,
Rising up so green and tall;
It was all Hawai'i's native plants
With their backs against the wall!

You might find an old remnant Clermontia in a strawberry guava thicket, slowly being strangled by the allelopathic qualities, the toxic roots and leaves, of the guava. You will find no keiki.

The curve of the flower mirrors the curve of the honeycreeper's beak; the birds are almost all extinct, and the plants are on the same path.

I urge the people of Hawai'i to support the release of the scale insect and do this little bit to save our unique but dwindling native forests.

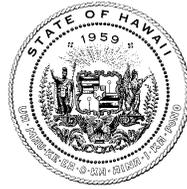
Aloha,

Three newspapers would
not print this!

Pete Sparks
(808) 640-5504

supakusu@aol.com

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Pete Sparks
46-4083 Kapena Rd.
Honokaa, HI 96727

Dear Mr. Sparks:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 25, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Bryon Stevens/DLNR/StateHiUS

I would like to express my support for the release of the *Tectococcus* insect as a biocontrol agent for strawberry guava, both on my own behalf as a resident who frequently visits our native forests for recreation, and in my capacity as a professional natural resource manager for the State of Hawaii's Natural Area Reserve System.

It should be obvious to anyone with any familiarity with Hawaii's native terrestrial ecosystems that the most dangerous threat to their continued existence is invasion by non-native species, particularly habitat modifying plants such as strawberry guava. Biological controls are the only feasible method of slowing the rate of invasion across large areas of extremely rugged terrain.

A large part of my job involves chemical & mechanical control of non-native plants in Natural Area Reserves, and I can speak first hand about how futile these efforts will be in the long run, without the use of well chosen biological control agents. Small areas might be manageable with "traditional" methods, but the survival of the ecosystem at large is a lost cause without additional tools.

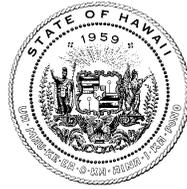
I have been following the on-going saga of strawberry guava control for some time, and feel that the DOA and cooperators have done a commendable job of researching possible agents, and have gone above and beyond the necessary for public outreach and environmental review.

Given the level of misinformed public outcry over this issue, I feel that it is especially important that DOA proceed with this release, and not set a precedent of 'knuckling under' just because of noise made by a few wackos worried about availability of sticks to make fish-scalers. Doing so would only jeopardize future research and release of control agents for other pest species...

LET THE BUGS LOOSE!

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bryon Stevens

Dear Mr. Stevens:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native species in Hawai'i, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha Hawaii Department of Agriculture,

Please do not introduce another invasive species insect the Brazilian scale insect called *Tectococcus ovatus* into the Hawaii environment. What will the insect do when all the guava trees are killed, where will it go and what will it infect? And what if it doesn't kill all the guavas just stun them and they rebound. I have even heard that all the insect will do is slows down the growth and slows down the fruiting. Strawberry guava fruit supplies food to the people.

What if the Brazilian scale insect called *Tectococcus ovatus* starts killing other plants that people on the Islands depend on for food and a living? Now you have a huge potential for an invasion that you can't control both insect and the guavas you want to kill. Insects by far are harder and more toxic to get rid of than just cutting down a tree and replanting other plants. Like all gardens you have to remove the weeds to allow the other plants to grow and take root.

I have been gardening in Hawaii for years and there is no way to get control of plants they want to grow because we have a marvelous growing environment. If you introduce an invasive species of insect you have **no control** of the insect. Guava trees can't fly like insects. This would be worse than introducing the mongoose that live during the day to kill rats that live mainly by night, which didn't work and now there is left an invasive animal.

You do have control of chopping down the guavas and replanting plants to take the place of the trees. This is how gardening works. Do something that makes sense. Do not invite another invasive species to pollute the Islands and create another problem that needs to be solved.

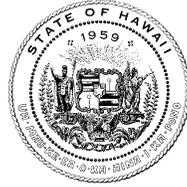
Please do not introduce the Brazilian scale insect called *Tectococcus ovatus* into the Hawaii environment.

Mahalo for listening,

Deb and Jack Streich
Captain Cook, HI 96704

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Deb and Jack Streich
Captain Cook, Hawai'i

Dear Mrs. and Mr. Streich:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your comment letter dated July 12, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect attacking other plants, please see FAQ No. 5. Regarding your concern about the availability of fruit, see No. 8. And concerning your comments about biocontrol in general and about manual control, see FAQ Nos. 3 and 4, respectively.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



Anna L. Subiono (Momi)
Hawaiian Cultural Practitioner/ Ethnobotany Educator
89-709 Lani Kona Rd.
Captain Cook, HI 96704
1(808)-328-8939

July 22, 2010

Hawaii State Department of Agriculture,
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Aloha,

I am writing to you in regards to the Environmental Assessment on the biological control of the strawberry guava plant and the method of you releasing a scale into our the Hawaiian Environment. My yard in Kona has strawberry guavas on it. My children have been raised with it and we have "always" used it in the pharmacopeia of our ancestors before us. This quote taken from your Environmental Notice, "In Hawaii, strawberry guava is a fast growing tree without any natural predators." This is a false statement. Many in Hawai'i who know the uses of guava, know that we use it for:

1. Food.

It is used in jams, jellies, cake, cosmetics and a cool refreshing treat while in the yard. The hunters use it while they are in the forest for food as well as my children who were raised on it.

2. Medicine.

Since the arrival of the guava on Hawai'i's shores, my ancestors used guava for medicine, and food. Therapeutically, it has been used as lomi (massage) sticks, (saving the native woods from

(2)

being used). Medicinally, we have been using the guava as a cure for diarrhea which is free and from the yard is the best way to keep the family away from the doctors and has been used by my ancestors since it arrived on the shores of Hawai'i.

The first statement in your document I see as false. We use it for food, and medicine. Therefore, we use it.

My ancestors are traditionally from Puna and I am the owner of three acres there. As a descendant of Puna, I do not agree with this type of biocontrol you are planning. We have no strawberry guava on our property in Puna. We have one yellow waiawi, but we do have the endemic 'ohi'a lehua, which raises my concerns. I talked to the Dep. Of Ag who stated, " we can't guarantee the scale will not jump to other plant species" therefore, this project is irresponsible and overlooks the health issues caused by the Department of Ag (pet control), and the Department of Land and Natural Resources. Introducing another biological scale into our environment could very possibly jump to the 'Ohi'a lehua (*Metrodiseros sp.*), used as medicine and for house construction and ceremonially, and medicinally, the 'ohi'a 'ai (*Syzygium malaccense*), and Nioi (*Eugenia sp.*) which are also used as medicine. 'Ohi'a 'ai is not only a medicine but also a food and holds very high usage in Hawaiian ceremony. These trees are all at risk and are an integral part of the Hawaiian culture and identity. Although, I agree something needs to be done about the strawberry guava in the forest, I think this idea of biological control is a threat to the Hawaiian environment, lifestyle, identity.

In Kona, we have strawberry guava on our dryland 'ohi'a forest property which we keep under control and use for food and medicine. My children (3) 2-22 in ages have all been raised on strawberry guava.

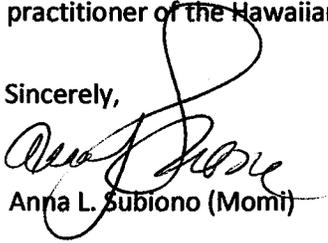
Since the irresponsible and disastrous introductions of the mongoose, kiawe, christmas berry, (aquatic) ta'ape, and roy fish (which are carriers of cygateria), in Hawai'i, our environment suffered much. This is alarming because you are affecting a food and medicine resource for many traditional families in Hawai'i. The scale will affect the fruit by taking nutrients, from the fruit. We eat that fruit for it has nutritional and medicinal usage for generations past fifty years. Specifically the usage of chewing on the young leaves for diarrhea, makes the scale a hindrance to our health. There is no better natural remedy.

(3)

This is a form of bioterrorism because you are dispersing a biological disease on a fragile environment and cannot guarantee there is a chance of cross contamination. It is a ludicrous idea. The plan should be canned. It will cause health issues and environmental degradation and cause more species to go extinct. It is hewa. This is another unfortunate use and waste of your time and our tax dollars.

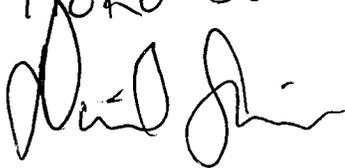
No thank you, we don't want to eat your scale and have it spread throughout our beloved forest trees. Please post this letter in your EA Final document. This is my testimony as a Native practitioner of the Hawaiian lifestyle and ethnobotany.

Sincerely,



Anna L. Subiono (Momi)

89-709 Lani Kona Rd.
Captain Cook, HI
96704

HOKU Subiono




State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Anna Subiono
Hawaiian Cultural Practitioner /Ethnobotany Educator
89-709 Lani Kona Rd.
Captain Cook, HI 96704

Dear Ms. Subiono:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA expressing your opposition to the biocontrol plan. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the impact on strawberry guava fruit and wood, please see FAQ No. 8. Regarding your concerns about biocontrol, see Nos. 3 and 5. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

First, we would note that in saying that strawberry guava lacks natural predators in Hawai'i, we do not mean it lacks beneficial uses. "Predators" refers to animals that feed on the plant. Part of your concern appears to be based on this misunderstanding.

1. Strawberry guava is valuable as a medicine.

Since its introduction to Hawai'i roughly 180 years ago, strawberry guava has become known in Hawaiian as waiawā (the yellow variety) and waiawā ula'ula (the red variety). None of the cultural practitioners consulted identified any traditional cultural practices or belief associated with strawberry guava (p. 60). While there was some discussion about the use of guava leaves for medicinal purposes such as a treatment for diarrhea, it was clearly the kuawa, or common guava, that was being referred to, not the strawberry guava. Many cultural practitioners might prefer to use native woods because of the spiritual essence they contain, and refrain from using strawberry guava because of its deleterious effects on the native forest. However, we respect your mana'o, and your letter, as you request, will be reproduced in the Final EA.

Concerning your use of strawberry guava, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

----- Original Message -----

From: Dennis Y. Suzuki

To: hdoa.ppc@hawaii.gov

Cc: Bob Nakamura

Sent: Friday, July 26, 2010, 10:10 AM

Subject: Strawberry Guava Plant

To whom it may concern,
The Department of Agriculture Plant Pest Control Branch
1428 South King Street
Honolulu, Hawaii 96814

My client is in the clean burning wood and natural charcoal business, small business in Honolulu, Hawaii and I will become a consultant and project manager, if this project get funded. Going outside can help bring products to market faster and cut development costs, while it gives the innovator access to our made and grown in Hawaii marketing might and a share of sales. As a authorized distributor for Kerry Ingredients & Flavors, Red Arrow and Flavor Dynamics and their technical support, we can assist in getting rid of your pesky strawberry guava plant by placing a bounty on the strawberry plant from your grant by making add value products for example: Kiawe Guava Liquid Smoke,, made and grown in Hawaii and create hundreds of jobs.

Can you ask Neil Reimer, chief of state agriculture Plant Quarantine Branch, The Department of Agriculture Plant Pest Control Branch and Land and Natural Resources, Division of Forestry and Wildlife and U. S. Department of Agriculture Forestry Service, Tracy Johnson, research entomologist, if grants are available. My professional team made up of small businesses, professional writers with publications and I are willing to submit a Hawaii supplemental environmental grant application proposal to thin down and slowly get rid of strawberry guava dominates part of a rainforest in the Hawaii and the plants grows more densely in Hawaii than in their native Brazil, with the consequence that an infestation could spread more readily. And now, there are human predators for the strawberry guava plant. We will collect strawberry guava plant from residents yard and offer an incentives from the grant. Most of the work will done by licensed tree trimmer so we don't damage our native forest. This project will create hundreds of jobs for Hawaii unemployment. We can even hire Veterans too. We can work close to the trails for starters, so we can thin out the strawberry plants and place stump remover on to the strawberry plants.

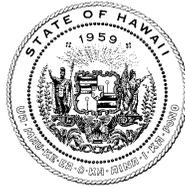
Get back to me, if a supplemental environmental project grant can be created for the pesky but popular strawberry guava plant.

Solutions are available. Dr. Robert Nakamura, PH. D and Dennis Suzuki, Project Manager can help. **The above information must be kept confidential! For Your Eyes Only...**

Mahalo,
Dennis Suzuki

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

November 1, 2011

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

Dennis Suzuki

Dear Mr. Suzuki:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 26, 2010, on the Draft EA about your hopes to establish a market for strawberry guava wood. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your subject matter differed from the list, our response to that specific comment follows, even though your request is outside the scope of this EA. We hope this is helpful. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The Department of Agriculture should instead find productive uses for strawberry guava.

There are some existing productive uses for strawberry guava wood that will not be affected in any way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

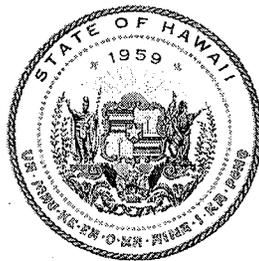
Some have suggested that stands of strawberry guava provide a potential untapped source of biomass energy whose integrity needs to be preserved as a sustainable resource for Hawai'i. Chris Buddenhagen, former Coordinator of the Hawai'i Invasive Species Council, and Scott Turn, of the Hawai'i Natural Energy Institute, explored the potential for this use (p. 52). The energy value of strawberry guava was measured at 8,240 British Thermal Units (BTU) per pound. Assuming a high value of oil at \$116 per barrel, the raw biomass value of strawberry guava wood from a high density stand (60,000 pounds per acre found by Dr. Flint Hughes at Keauohana Forest Reserve on Hawai'i Island) would be approximately \$9,850 (lower density stands would yield lower returns). This raw value, however, needs to be adjusted for the cost of harvesting, chipping and drying, and transporting. Unfortunately, harvest costs are very high even for stands of strawberry guava with adequate access. For conservation areas that are not immediately adjacent to roads, labor costs for harvest alone would be expected to exceed \$10,000 per acre. Thus, even with high oil values, the biomass value of stands of strawberry guava would likely be net negative.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



The Senate
The Twenty-Fifth Legislature
of the
State of Hawaii

STATE CAPITOL
HONOLULU, HAWAII 96813

July 23, 2010

Dr. Neil Reimer
Department of Agriculture, Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT—BIOCONTROL OF
STRAWBERRY GUAVA BY ITS NATURAL CONTROL AGENT FOR
PRESERVATION OF NATIVE FORESTS IN THE HAWAIIAN ISLANDS

Dear Dr. Reimer:

I am writing to share my concerns about the draft environmental assessment for biocontrol of strawberry guava. The damage caused by invasive species in our fragile island state is an important issue and I appreciate the work undertaken by the Plant Pest Control Branch and others to address this critical problem. However, in this particular case I strongly oppose the conclusions of the draft environmental assessment, which if adopted, would obviate a more thorough environmental impact statement.

This case warrants an environmental impact statement because the widespread introduction of this insect is irrevocable and unanticipated consequences of the introduction could negatively affect agriculture on the Big Island, especially commercial crops including guava. Further, given the current economic realities, many of our residents rely on strawberry guava for food and other uses more now than in the past and likely in the future.

In closing, I agree that the invasion of strawberry guava into our native forests has had devastating effects on our native forests. Nonetheless, proceeding prudently by developing an environmental impact statement will help ensure the soundness of the environmental conclusions in the draft environmental assessment as well as provide for greater public input

Dr. Reimer
July 22, 2010
Page 2

and discussion, which will also address the polarization in the community regarding this sensitive issue.

Sincerely,

A handwritten signature in black ink, appearing to read "Dwight Y. Takamine". The signature is stylized and cursive.

Senator Dwight Y. Takamine

c: DLNR, Division of Forestry and Wildlife
Geometrician Associates



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Dwight Takamine
Dept. of Labor and Industrial Relations
Keelikolani Building
830 Punchbowl Street
Honolulu, HI 96813

Dear Director Takamine:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the use of strawberry guava fruit, please see FAQ No. 8. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

2. The action will be irreversible.

Although it is not yet certain that *Tectococcus ovatus* will survive and effectively inhabit strawberry guava forests in Hawai'i, if the action is successful, it is indeed essentially irreversible, as are all successful biocontrol projects. Rather than a reason to decline to implement the project, this is the reason for the rigorous testing that was undertaken to determine whether there might be adverse effects. There is no action that has consequences that are completely predictable, and thus there is uncertainty associated with any proposed action, including this one. Uncertainty must be weighed against potential benefits of an action and adverse impacts that are likely to occur if an action is not undertaken. In this case, there is a consensus among biologists in Hawai'i that strawberry guava is deleterious to the native ecosystem and that the risk of severe ecosystem damage is continually increasing. The uncertainty associated with biocontrol of strawberry guava appears to be low due to the rigorous testing of this biocontrol agent and the general success of biocontrol projects in Hawai'i. Balanced against the certainty of the damage posed by continued growth of strawberry guava, the magnitude of its threat to Hawai'i's endangered species and ecosystems, and the urgent need for a more effective method for protecting these resources at risk, the levels of uncertainty associated with the proposed action appear acceptable.

3. *Will Tectococcus ovatus attack common guava as well?*

Extensive laboratory testing in Brazil, Hawai‘i and Florida found no impact on common guava from the scale insect. The evidence also includes more than 15 years of observations of the insect populations developing on strawberry guava in close proximity to common guava trees at field sites in Brazil. A review of Brazilian literature on pests of common guava showed no mention of the scale insect or any other gall-forming homopterans (scale insects, aphids and relatives) (pp. 37-38).

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai‘i Department of Agriculture

cc: Senator Malama Solomon

P.O. Box 6039
Kamehela ~~Honokaa~~, Hawaii 96727 96743
(808) 936-1081

July 14, 2010

Dr. Neil Reimer
Hawaii State Dept. of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, Hawaii 96814

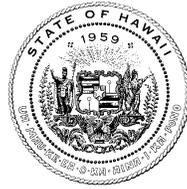
Dear Dr. Reimer:

I am writing in strong opposition on the project titled bio-control of strawberry guava. A through environmental impact statement must be done.

Sincerely yours.

Darcey Takushi
Darcey Takushi

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Darcy Takushi
P.O. Box 6039
Kamuela, HI 96743

Dear Ms. Takushi:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 14, 2010, on the Draft EA. Your opposition to the biocontrol program is noted. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. As your concern differed from the list, our response to that specific comment follows.

1. An EIS should be done because the project may have significant impacts.

The particularly thorough EA prepared for the project has adequately demonstrated that the action would not have significant adverse effects.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

I work for the College of Tropical Agriculture and Human Resources of the University of Hawai'i at Manoa. However, I am submitting these comments as a private citizen, not as a representative of any part of the University of Hawai'i. I am writing in support of "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands" as proposed by the Pest Control Branch of the Hawai'i State Department of Agriculture. As someone who was born and raised in Hawai'i and who studied biological sciences at the University of Hawai'i, I appreciate the unique diversity of the plants and animals of these islands--including the insects. It is not exaggeration when I say I am saddened by loss and diminishing of the native species, as well as the cultural significance they have for the Native Hawaiian people. (I am not of Hawaiian ancestry.) To allow the continued spread of strawberry guava will negatively impact many native plant and animal species, their habitats and their diets. Possibly even more importantly, I am convinced that the strawberry guava, with its deep-rooting system will negatively impact that scarce and precious resource: our water supply. Therefore, I think it is necessary to control the spread of strawberry guava in Hawai'i. This then leads to the question of what method to use to control the spread of strawberry guava. I am somewhat familiar with the criteria and procedures used to identify and propose species for importation for the purpose of biocontrol. I have seen that these are extremely selective and painstaking; they are unlikely to allow introduction of an inappropriate biocontrol species. Other methods to control are hand-weeding and applications of pesticides. Both of these methods can be selective so that only the strawberry guava is either pulled or poisoned. However, both of these methods are very labor-intensive and must be maintained constantly, since the strawberry guava WILL return to the areas from which is "cleared." Even in good economic times, the state would likely not be able to afford either of these methods to control strawberry guava. In poor economic times, like now, such as expenditure would be impossible. Invasive species will not slow down and wait until we can afford crews to hike out to pull them. The biocontrol measures proposed by the Pest Control Branch should be put into practice, the sooner the better. Thank you for the opportunity to speak on in support of this proposal.

Aloha, Cathy Tarutani

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Cathy Tarutani

Dear Ms. Tarutani:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biocontrol of strawberry guava has a crucial role to play in conservation of our state's unique natural environment and the fresh water it provides us. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

CHARMAINE TAVARES
MAYOR



OFFICE OF THE MAYOR
County of Maui

200 South High Street
Wailuku, Hawaii 96793-2155
Telephone (808) 270-7855
Fax (808) 270-7870
e-mail: mayors.office@mauicounty.gov

July 22, 2010

Dr. Neil Reimer
Hawaii State Department of Agriculture,
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawaii 96814

Dear Dr. Reimer:

**RE: PROPOSED RELEASE OF BIOLOGICAL CONTROL AGENT
FOR STRAWBERRY GUAVA**

I am writing to express my support for the proposed introduction of a strawberry guava biological control agent into Hawaii by the United States Forest Service.

Hawaiian watershed forests provide us with fresh water, critical for human health and well being, our economic prosperity in Maui County, as well as habitat for native flora and fauna. These species carry extreme importance for perpetuating our unique Hawaiian culture, which no alien or invasive plant and animal can do.

Experts warn that many of our forests in Maui County are threatened with complete replacement by strawberry guava in coming decades if significant measures are not taken. University of Hawaii scientists have recently demonstrated that our native ohia forests are much more efficient at storing critical water resources and waste considerably less water to the atmosphere through evapotranspiration than do forests that are invaded with strawberry guava.

The value of native ohia as a storer of water resources and wastage effects by strawberry guava have been proven to be greatest during dry or drought periods like those Maui County is currently suffering. Heading into an era of climate change with greater and more likely drought periods makes this difference in water uses by these two forest types simply a critical issue.

Much of the negative publicity surrounding biological control, such as the age-old story of introducing the mongoose to control rats in Hawaii, was based on untested methods that are now over a century old. Biological control has been honed and developed into a careful and tested science and is used around the world today.

Dr. Neil Reimer
July 22, 2010
Page 2

Years of careful study have assured experts that the biological control agent, *Tectococcus ovatus*, will attack only strawberry guava. Common guava and all other native and introduced plants will not likely become new or additional hosts. It is important to recognize that *Tectococcus* will only slow the growth of strawberry guava and is not expected to eradicate it. This action will give our native watershed plants a fighting chance to compete in a more balanced environment and to do their job of providing our community with an abundance of clean, fresh water.

The efforts of the U.S. Forest Service are the culmination of decades of careful work by international scientists, particularly in the U.S. and Brazil, to develop a more timely, cost-effective, and comprehensive approach to our battle with such an aggressive invasive species. I fully support this effort to save Maui County's watersheds and urge you to decide in favor of approving the release of *Tectococcus ovatus*.

Thank you for your consideration of this matter. If you have any questions, please feel free to contact Kuhea Paracuelles, who serves as the Maui County Environmental Coordinator under my administration. She can be reached at (808)270-8299 or Kuhea.Paracuelles@mauicounty.gov.

Sincerely,

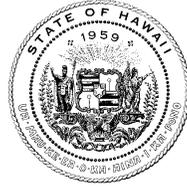


CHARMAINE TAVARES
Mayor, County of Maui

CT:kp

xc: Kuhea Paracuelles, Executive Assistant – Environmental Coordinator

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

The Honorable Charmaine Tavares
200 S. High St.
Wailuku, HI 96793

Dear Mayor Tavares:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable. Thank you for your efforts to protect native ecosystems in Hawai'i.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

cc: Mayor Alan Arakawa

Comments by The Nature Conservancy of Hawai'i on
the Draft Environmental Impact Statement for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands
June 2010

The Hawai'i Department of Agriculture and its partners at the U.S. Forest Service are to be commended for their individual and collaborative work to identify, thoroughly research and develop safe, effective and host-specific biocontrols for some of the worst pests plaguing Hawai'i. Conservation land managers, farmers, nurserymen, ranchers, and government officials have been losing the battle to control some of the most intractable pests that have become established in Hawai'i. In some cases, the scale and scope of the problem has rendered traditional control methods ineffectual. At best we have a finger in the dike. At worst, we are delaying a tidal wave infestation. While biocontrol agents seldom completely eliminate their targets, they act to keep the spread of the pest species under control and allow for a combination of techniques to effectively manage pest species. We need to thoughtfully and with scientific rigor employ every tool at our disposal to battle these invaders in order to protect what remains of our native forest resources, our critical diversified agriculture industry, and the precious quality of life we all enjoy in Hawai'i.

Oceanic islands are well known to be especially vulnerable to invasive species. Before humans arrived in Hawai'i about 1,500 years ago, the archipelago's unique species adapted in isolation with relatively few natural predators, diseases or other threats and, thus, lost or never developed many common defense mechanisms to fend off insect pests, browsing animals, or diseases. However, in today's global economy, Hawaii's inviting climate provides safe harbor for multitudes of invading species. Indeed, the colonization rate of introduced insects and mites in Hawai'i has been estimated at 500 times the rate (per unit area) of the continental United States.

Unfortunately, more native species have been eliminated in Hawai'i than anywhere else in the United States. Hawaii has lost more than half its native forests. The forests that remain are vulnerable to invasive weeds, human impact, and climate change. Hawai'i has lost about 8% of its native plant species and an additional 29% are at risk. With just 0.2% of the U.S. land area, Hawai'i has about 25% of U.S. endangered species. Although habitat destruction from human development has historically been a cause of extinction and endangerment, the introduction and spread of invasive alien species is now the predominant cause of ecological loss in Hawai'i.

Strawberry guava is one of the most disruptive alien weeds in Hawaii's native wet forests infesting thousands of acres on all the major islands. It forms dense thickets and suppresses and displaces native vegetation. It is also a host for non-native fruit flies that annually cause millions of dollars per year in losses for Hawaii's diversified agriculture industry. Research also shows that strawberry guava causes significant water loss to Hawaii's fresh water sources as compared to native plants and trees. Healthy native forests act like a sponge to trap water from rain and cloud moisture and deliver it efficiently to streams and aquifers for municipal and agricultural uses. Strawberry guava's characteristics of enhancing runoff and high evaporation are an enormous threat to one of our most precious natural resources—clean fresh water.

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Although strawberry guava is considered a resource by some for jams and possibly a supplemental food source, few people eat very much on the trail without getting a bellyache. In the wild, the fruit feeds more rats and non-native fruit flies than people. And although it is one component of a pig's diet, research shows that pigs rely as much or more on other non-native plants, earthworms, and the native hapu'u fern.

The level of the infestation of strawberry guava in Hawaii's native forests has rendered traditional chemical and mechanical control methods ineffectual on their own. It grows in such thick dense clumps that nothing else can grow, and even walking through a thicket is nearly impossible. Aerial images of native forests thought to be in good health show an ongoing encroachment of strawberry guava trees. If nothing is done, in time, strawberry guava will spread into all remaining native forests and in some cases will completely take over, pushing out native plants and animals. Failure to control strawberry guava's spread will come at the grave cost of countless biodiversity, cultural and ethnobotanical resources that make up our native forest systems. Culturally important plants like maile and palapalai can grow, and koa and 'ōhi'a can recover, where strawberry guava growth is prevented or slowed.

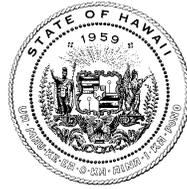
Knowing that chemical and manual or mechanical control for strawberry guava would not prevent its further spread, scientists in the Department of Agriculture, the U.S. Forest Service, and other partners determined that research into biocontrol was a potentially viable option. After years of study, a possible solution was found in Brazil – the home country for strawberry guava. Here in Hawai'i, strawberry guava is an aggressive weed that takes over native plants and everything else in its path—nothing but strawberry guava grows in a thicket. In its homeland of Brazil, this plant grows in small clumps or as a single tree because it has a unique relationship with a small insect. The natural relationship between strawberry guava and this insect evolved over millions of years and allows them to co-exist in balance; a balance that is missing in Hawai'i.

Over 15 years, the Department of Agriculture and the U.S. Forest Service have conducted the in-depth research and analysis necessary to determine that this proposed host-specific biocontrol for strawberry guava will live only on strawberry guava, and it will not affect other plants or animals in Hawai'i. In test after test where this insect was placed directly on native plants like ohia or on agricultural plants like guava or papaya, it died. The insect only survived on strawberry guava. The Nature Conservancy is confident that this research is reliable and a good indication that this biocontrol will help slow the continued spread of strawberry guava into native forests without harming any other plants or animals in Hawaii.

The notion that this insect will evolve a new relationship with Hawaii's native or agricultural plants is simply a misunderstanding. It takes millions of years for specialized biological relationships like this to develop. With the extensive testing done on this biocontrol the risk is higher that it will fail than it will succeed. In the years before the 1960s, anyone could bring any plant, animal or insect into Hawaii and release it with no legal or other consequences. Fortunately, today we have extensive laws and regulations preventing random introduction and requiring extensive testing to ensure safety. In fact, biocontrols are so carefully studied and tested that the risk is higher new biocontrols will fail than succeed. Even if this new tool is completely successful and strawberry guava grows more slowly, it will still be in our forests; its wood and fruit available for harvest. But with this tool, our native forests will have a fighting chance of surviving and even thriving.

This natural control for strawberry guava will provide an important component in effectively managing one of the most significant pests of Hawaii's environment, agriculture, and quality of life.

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

The Nature Conservancy
923 Nuʻuanu Ave.
Honolulu, HI 96817

Dear Sir or Madam:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

i am no expert but i do have some concern on the release of the insect to control strawberry guava.

it has no natural predators, and it produces a leaf galls, that reduces the plants vigor and fruiting in BRAZIL, did anyone test it here? there could be other factors. leaf gall from what i read elsewhere doesnt seem to harm the plant significantly.

if it does work, you say that your going to leave trees for harvesting fruit? Do the bug know what trees?

please correct me if im wrong, doesnt strawberry guava only grow in certain elevation, and climate? cant we figure some other way, at least we know the problem today, its the trees, in the future with the bug bug release who knows? i live on kauai and we wont get rid of the fruit flies because of the coffee plants here. i say how apple snails devastate the taro plant, not saying that it was a control agent. i saw the egerates deplete our toad population the 'natural agent"for centipedes and other things that bite. im just saying we made allot of mistakes i hope we dont make any more. thank you, val

+++++



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Val

Dear Val:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated June 24, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about testing of the scale insect, please see FAQ No. 6. As your other concern differed from the list, our response to that specific comment follows. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. The biocontrol effort won't effectively reduce the fruit fly problem.

Attempts at management of fruit fly pests in Hawai'i are severely constrained by the abundance of fruiting strawberry guava. Researchers who have worked extensively with farmers say that with almost every crop studied, the number-one problem was the impact of strawberry guava (p. 13). They estimate that 95 percent of fruit fly populations can originate from wild common or strawberry guava stands. In windward wet climates, strawberry guava is the predominant host, providing breeding grounds for high populations of fruit flies that can attack orchard fruits up to five miles away (p. 51).

The potential for strawberry guava to sustain fruit flies and ruin other agricultural crops is well known in other locations. For example, in Florida, the protocol for certifying fresh citrus fruit to be fruit-fly free involves having the crops located at least 1.5 miles from strawberry guava, whether wild or within the landscape of a residence (p. 13).

In response to some of your other comments, as you note, egrets and apple snails are not examples of modern science-based biocontrol. Egrets were purposely introduced in 1959 and apple snails were an accidental introduction, neither of which would pass modern biocontrol standards. And strawberry guava grows from sea level to at least 4,800 feet, i.e., 90%+ of the land mass in Kaua'i with adequate rainfall. Finally, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Bettie Van Overbeke
12-423 Ole'Ole St.
Pahoa, HI 96778
July7, 2010

Hawaii Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu, HI 96814

Copy to:
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punch Bowl S, Rm 325
Honolulu, HI 96813

Dear Sirs:

I am opposed to releasing the guava bug on Hawaii Island for the following reasons:

1. Maps of guava concentration published in the Hawaii Tribune Herald show Oahu with much larger numbers, so Oahu should be the site of experimentation not Hawaii Island.
2. Allergenic reaction to the insect has not been evaluated. I am highly allergic to chitin and increasing concentrations of it with increased insect biomass could be a problem. This has not been addressed.
3. Dead trees are ugly. We are a tourist economy and tourists don't want to see roads lined with sick and dying trees. Tourists are fascinated by seeing fruit growing wild on roadside trees and often pick it. Removing rather than leaving sickly trees lining the road would be more appropriate.

4. Guava comes in where the ground is disturbed, usually by human intrusion with heavy equipment. Stop clearing in woods and it is less of a problem. Much guava appears in lots prematurely cleared for development .

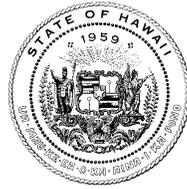
5. I am a farmer. I have noticed that when I remove one type of weed it does not mean I will get the desired crop , instead one gets two new weeds in place. When guava is removed *Albezia* comes in or *Melochia umbrelata* or *Trema orientalis*(gunpowder tree). These trees shade out any still existing ohia.

6. Guava is a food tree. Food is becoming scarce on our overcrowded planet and we will need all we can get as we exceed the planets carrying capacity. It is just plain STUPID to attack any food plant.

&. The problem in Hawaii is poor use of existing resources due to lack of imagination in governance and administration. Guava is an undeveloped resource . If the grant money used in this misguided attempt to eradicate guava was applied to methods to utilize it , the economy and nature could both profit.

Sincerely,


Bettie Van Overbeke



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Bettie Van Overbeke
12-423 Ole'ole St.
Pahoa, HI 96778

Dear Ms. Van Overbeke:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 7, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about the loss of fruit from the biocontrol, please see FAQ No. 8. As most of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. O'ahu has more of strawberry guava so release should be done there.

In fact, strawberry guava infests a much larger area on the island of Hawai'i. In any case, like most insect species that establish in Hawai'i, populations of the proposed biocontrol agent are expected to extend over time to all areas where there is suitable habitat. Limiting an insect species to one site is not realistic based on past experience. Also, the risks of using biocontrol have been evaluated at a statewide level and determined to be minimal by State and federal regulatory processes for biocontrol introductions (pp. 28-29).

2. The scale insect may have allergenic effects.

It appears very unlikely that *T. ovatus* poses any risk to human health (p. 25). Allergenicity of substances generated by homopterous insects such as this scale insect is rare (p. 84). Among hundreds of species of soft scale insects around the world, including many very abundant pest species, allergic reactions are not associated with the insects directly, but with certain commercial products such as lacquer and dyes derived from a few species. As a gall-forming insect, *T. ovatus* spends most of its life inside leaf tissue where it is not exposed to humans. The tiny eggs and nymphs produced from female galls are present only briefly in the environment and are likely to remain on plants or fall to the ground and die. Adult males are also short-lived and unlikely to travel far. Human exposure to this species is not likely to be any greater than any other common harmless plant-feeding insect in the environment.

3. The Department of Agriculture should remove sickly strawberry guava trees along roads.

Because the leaf galls produced by *T. ovatus* in Brazil do not lead to severe defoliation or deformities in the tree, except possibly in cases of an unusual combination of stresses such as prolonged drought which would also affect most other plants, the presence of the scale insect will not be obvious except under close inspection of the trees. Galls formed on strawberry guava leaves are comparable to those that naturally occur on 'ōhi'a, which affect the plant's metabolism but do not disfigure it (pp. 66-67).

4. The government should stop clearing of land which leads to strawberry guava infestations.

Although strawberry guava is known to invade land after clearing, preventing further clearing (which would also impact agriculture and home-building in many lots) would not address the problem of extensive invasion by strawberry guava in relatively undisturbed native forests on conservation lands (pp. 13-14, Figures 1a-c).

5. Removing strawberry guava just invites other invasive species to take hold.

Whether strawberry guava under suppression by biocontrol is replaced over time by native or alien plant species will depend upon a number of factors, including the climate and geology of the particular location, its history of disturbance, the vegetation context, and human intervention. In lowland areas already disturbed and/or heavily infested by invasive aliens, replacement of strawberry guava by primarily alien species is more likely than replacement by natives, in the absence of active management. In native forest, the chances of natives replacing strawberry guava, which is often the pioneer and primary serious invader, are much greater (p. 41).

Because the impact of the scale insect on strawberry guava populations is expected to be gradual, reducing recruitment and plant vigor over a period of many years, chances for replacement with native species is expected to be higher than if strawberry guava were removed suddenly, for example by mechanical and/or herbicidal treatment, which is likely to cause greater disturbance. This advantage to gradual control has been demonstrated experimentally with the faya tree in Hawaiian rainforests. In this case, gradually killing the invasive trees by full or partial girdling led to higher recruitment of native species and lower recruitment of weedy species compared with complete removal of the invasive trees. In some areas invaded by strawberry guava, particularly at higher elevations, there are relatively few other alien weeds present. Native species are expected to gradually replace strawberry guava there and this would benefit native forest ecosystems (p. 41).

6. Strawberry guava is a valuable food plant.

Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be abundant strawberry guava and any party interested in using strawberry guava for fruit or wood will continue to be able to do so.

7. The Department of Agriculture should instead find productive uses for strawberry guava.

There are some existing productive uses for strawberry guava wood that will not be affected in any way by the proposed action. All agencies involved in conservation are keenly interested in practical applications, particularly those that would pay for removal of this invasive tree.

The EA provided an objective assessment of the potential for utilizing strawberry guava for biomass energy (p. 52-53) and concluded that harvest of wood for fuel would constitute a net loss and would not be sustainable. Although removal of strawberry guava for biomass fuel or material uses has been proposed as a way to defray the cost of control, this would only be feasible in areas close to roads (a small fraction of the total area). Removal of large amounts of biomass from remote areas would only be possible by helicopter, which would add far more cost than any potential value gained. It should be noted that even after introduction of the scale

insect, stands of strawberry guava adjacent to roads will still be accessible and may, if desired, be harvested for biomass purposes. Fruiting will be reduced, not eliminated, and the enormous reservoir of standing wood that currently exists will remain available for gathering for decades to come.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Eric Vanderwerf
Honolulu, HI

July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

I am writing to express my support for the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna. Releasing a biocontrol agent for strawberry guava is necessary to protect Hawai'i's native forests, and is the only way that strawberry guava can be effectively controlled on a meaningful scale.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. In fact, research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

O'ahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It reproduces in such numbers that 'ōhia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ōhi'a and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawai'i's

native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai‘i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give ‘ōhi‘a and koa seeds a chance to sprout.

Like Hawai‘i’s language and culture, Hawai‘i’s forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava’s natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. I hope that you will make an informed, rational decision on this important issue and work to protect Hawaii’s unique natural heritage by permitting the release of this biocontrol. The loss of our many native species due to willful neglect of the threat posed by strawberry guava, which is an alien species not native to Hawaii, would be unconscionable. Thank you for the opportunity to comment.

Sincerely,
Eric VanderWerf

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Eric Vanderwerf

Dear Dr. Vanderwerf:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

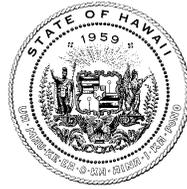
michael varnell

Sounds scary to me. This is such a closed area to set anything loose here. Remember the mongoose. I will do my homework and get back to you.

michael
hanalei hi.

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Michael Varnell
Hanalei, Hawai'i

Dear Mr. Varnell:

**Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava
by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands**

Thank you for your comment letter dated June 24, 2010, on the Draft EA about your concerns. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment about past biocontrol efforts, please see FAQ Nos. 3 and 5.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Carty Chang
Department of Land and Natural Resources
Engineering Division, Project Planning & Management Branch
Phone: (808) 587-0229, Fax: (808) 587-0283
Email: carty.s.chang@hawaii.gov
----- Forwarded by Carty S Chang/DLNR/StateHiUS on 07/09/2010 02:56 PM -----



Vicki Vierra
<vickiv@hawaii.rr.com>
07/09/2010 12:23 PM

To carty.s.chang@hawaii.gov
cc

Subject re: The release of scale insects to control strawberry guava and eliminating EAs

July 9, 2010

To the Department of Land and Natural Resources
Engineering Division, Project Planning & Management Branch:

Scientists tend to underestimate the time needed for species to adapt to changes in their environment. I believe you would be in error by releasing these foreign insects into our island environment, as they will most certainly learn to consume other similar species when they run out of waiawi. In addition, they have no predators here.

Furthermore, our island's poorest citizens utilize the waiawi for food. With a major depression underway, with no end in sight, the need for subsistence foods will be increasing.

I have just learned that the DLNR will be eliminating the Environmental Assessments on many projects, and the public input these entail. As state employees, your job is to serve the taxpayers who are paying your salaries. You need to be listening to us whether it is convenient for you or not.

As the definition of "pest" is constantly changing, it is important to maintain transparency and public input so that the public maintains a say in what happens to our island environment. While you may be adhering to EPA guidelines on the use of poisons, I feel that the majority of citizens lack any faith in the EPA to protect people from the toxins marketed by the giant chemical companies.

What I found shocking is that no one can tell me how many tons of Round-up and other poisons are being sprayed every year. I suggest you find out, before dumping any more poisons on the land here.

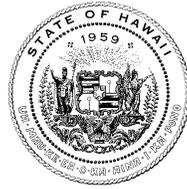
Waiawi is a food plant, and the timber is useful as well. Go after the "elephant grass" if you really want to eradicate a "pest". It has no use beyond being turned into mulch or biofuel.

As for the coquis, they are eating fruit flies and mosquitos, and their singing is much less aggravating than leaf blowers, which are another pest you should be eradicating from your departments.

Sincerely,

Vicki Vierra
HC 1 Box 5077
Keeau Hawaii 96749

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Vicki Vierra
Keaau, Hawai'i

Dear Ms. Vierra:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 9, 2010, on the Draft EA. We have noted your opposition to the biocontrol effort. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect targeting other plants, please see FAQ Nos. 6 and 5. Regarding your concerns about the loss of fruit, see FAQ No. 8. As for your comment about biocontrol for other invasive species, see No. 2. Please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so. Furthermore, for those who do not wish to use herbicides to control strawberry guava, biocontrol offers a method that will help slow the spread.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads 'Neil Reimer'.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



Shaping the future for birds

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Dear Dr. Reimer and the Hawai'i Department of Agriculture:

The American Bird Conservancy strongly supports the release of *Tectococcus ovatus* as a natural control agent for strawberry guava (*Psidium cattleianum*). Strawberry guava is one the most severe threats to Hawai'i's precious and unique biodiversity. Releasing a biocontrol agent for strawberry guava is necessary to protect Hawaiian forests and their unique bird life.

Hawai'i's forests should be dominated by native species such as 'ōhi'a or koa, but strawberry guava is outcompeting these species, preventing regeneration, and dominating the lowlands of the state. Strawberry guava forms dense, impenetrable thickets that do not support the natural diversity of birds, insects, and other plant species normally found in Hawai'i. Strawberry guava does not provide the nesting habitat or food resources the native forest birds require. These dense thickets also prevent any understory from forming, greatly increasing the rate of erosion, thereby damaging the water quality throughout the state. We must act now to prevent further damage to the ecosystems of the state.

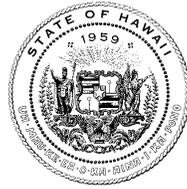
T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but the current chemical and mechanical control methods are inadequate to keep up with strawberry guava's expansion. *T. ovatus* will not eradicate strawberry guava, nor even completely halt its expansion. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Fewer strawberry guava seedlings means more 'ōhi'a and koa seeds will have a chance to sprout, survive, and grow into mature trees, allowing the native forests and birds a chance to recover.

Hawai'i's forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing a natural biocontrol agent for strawberry guava is the prudent and responsible action to take to protect Hawai'i's forests for future generations to enjoy. Please think of all the species already extinct, and act now to prevent additional losses. Thank you for your consideration, and please act to protect Hawai'i's biodiversity.

Sincerely,

George E. Wallace, Ph.D.
Vice President, Oceans & Islands Division

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

George E. Wallace, Ph.D.
Vice President, Oceans & Islands Division
American Bird Conservancy
P.O. Box 249
The Plains, VA 20198

Dear Dr. Wallace:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian bird species, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Dear Dr. Reimer,
Attached and copied below are my brief comments on the subject item.
Rick Warshauer

TO: Hawai'i State Dept. of Agriculture, Plant Pest Control Branch
FROM: Rick Warshauer, PO Box 192, Volcano, Hawai'i, 96785
SUBJECT: DEA prepared for the Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Dear Dr. Reimer,

I am writing comments on the DEA prepared for the Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands. **I strongly support the release.** I suggest the following information be added to the final EA to add to its perspectives and accuracy.

Strawberry Guava Distribution. I have spent considerable amount of time surveying native and alien plants in Hawaii forests since 1972. I have a good idea about the spread and threats from Strawberry Guava, as I have been to many places repeatedly over a long time, and did a systematic survey of alien plants in conjunction with the Hawaii Forest Bird Survey from 1977-1981. Some of these results are cited in a 1992 publication with Jim Jacobi, where predicted range expansions of several species were made, including for Strawberry Guava. Since then, not only has Strawberry Guava met these predictions, it has continued beyond maximum elevation expectations and in forming dense stands at elevations higher than expected. The result of dense stand formation is always complete replacement of the native vegetation and near-complete replacement of native plants with Strawberry Guava. In that light, I find that your distribution maps grossly underestimate the elevation range and densities of Strawberry Guava that can be expected without curtailment. Easily observed examples can be seen along the Volcano Highway in Ola'a Forest Reserve, just below Kahaule'a Road near the 22 mile marker, and just within the Hawaii Volcanoes National Park boundary at Volcano, mauka side. In doing many hours of low helicopter survey work for Miconia, I saw lots of forest areas irretrievably invaded by dense stands of Strawberry Guava in many areas of the island, again suggesting that your potential distribution maps are underestimating even the current distribution and densities over large areas. This underscores the threat to native forests that Strawberry Guava presents and the scale of loss of native plants and animals that can be expected unless there is curtailment.

Cultural Losses to Strawberry Guava. Another ongoing loss of resources is the widely distributed presence of "canoe plants" brought to the Hawaiian Islands by colonizing Polynesians. In my forest surveys throughout the islands, I have seen populations of numerous canoe species (including noni, kukui, kamani, wauke, ohia 'ai, 'awa, 'ohe, 'awapuhi, ape, kalo, ki, uhi, and 'ape) as well as cultivated native species such as hala, olona and opuhe. All of the ones that I have just listed, mostly windward species of low and mid-elevation environments, are subject to displacement by ongoing Strawberry Guava invasion into these areas, including the large trees that will lose their replacement keiki. Pre-contact Hawaiians utilized many wild native species gathered in the low and mid-elevations, many of which are being lost to Strawberry Guava. In

addition to the resources of the sea and the stones and soil of the land, these plants and the several canoe animals were the only physical environment that sustained the Hawaiian people.

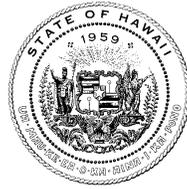
That so many of these cultural resources are being negatively impacted by this single aggressive alien species is a cultural calamity. Strawberry Guava also covers and disrupts the physical remains of windward and wetter leeward areas that the original Hawaiians farmed and lived.

These include stone and earthen terraces for agriculture, auwai and stone structures used for living, animal enclosures and religious purposes. Post contact usage of the haole-introduced Strawberry Guava is just another part of the conversion of the original Hawaiian culture, like christianity, foreign land ownership, the sugar economy and politics, and the displacement of rights, language, sovereignty, water and land—hardly a cultural balance.

Overall, I feel that the DEA does a thorough job in evaluating the costs and balances of proceeding with the release or of not doing so, and I support it.

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NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Rick Warshauer
P.O. Box 192
Volcano, HI 96785

Dear Mr. Warshauer:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 16, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. Your observations on the transformation of our Hawaiian landscape by strawberry guava are echoed in the experiences of many other commenters. Regarding the current and potential future distribution of strawberry guava, we realize that the maps in the EA are conservative in representation of current dense infestations in some areas, and that the maximum elevation of its occurrence has increased in recent decades and likely will increase further in the future. We appreciate your indication of impacts of strawberry guava invasion on remaining sites with Hawaiian "canoe plants" and other resources of cultural significance. The EA has been modified to mention these resources.

We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native species in Hawai'i, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer". The signature is written in a cursive style with a long, sweeping underline.

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Aloha,

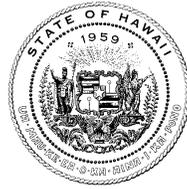
Please support biocontrol of strawberry guava. This tool is essential in the preservation and protection of native Hawaiian forests. As land managers faced with the challenges of combating invasive species, we must utilize all possible methods of controlling threats to our native ecosystem. Within the Pu‘u Kukui Watershed Preserve, we have seen populations of strawberry guava (*Psidium cattleianum*) spreading mauka toward pristine native bog habitat. Biocontrol is a necessary option for controlling spread and establishment; once established, there is no hope of manually controlling the species. The limited resources available to conservation entities shrink daily and we need to find and utilize effective and efficient tools such as *Tectococcus ovatus*. Thank you for your consideration,

Megan Webster

Puu Kukui Watershed Preserve
Maui Land & Pineapple Co., Inc.
200 Village Road
Lahaina HI 96761

+++++

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Megan Webster
Puu Kukui Watershed Preserve
Maui Land & Pineapple Co., Inc.
200 Village Road
Lahaina HI 96761

Dear Ms. Webster:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant. This new tool should make other efforts, including yours on behalf of native Hawaiian ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

July 21, 2010

Dr. Neil Reimer
Hawai'i State Department of Agriculture,
Plant Pest Control Branch
1428 South King Street
Honolulu, Hawai'i 96814

Dear Dr. Reimer,

I am writing to support the introduction of the carefully tested strawberry guava (*Psidium cattleianum*) biological control into Hawai'i by the U.S. Forest Service.

During my 32 years as a Maui resident, I have personally seen the devastating effects of strawberry guava on tens of thousands of acres of Maui County's watershed forests. This Brazilian species has acted to progressively displace native Hawaiian *Metrosideros* and *Acacia* watershed forests in Maui County and continues to aggressively spread. Physical and chemical control of this species at the scale it has now invaded is beyond feasibility and is not economically feasible.

These native forests, that are being progressively displaced by strawberry guava, supply us with potable water and habitat for Hawaiian plants, birds and insects. Many of these species are unique to Maui and listed as endangered by the U.S. Fish and Wildlife Service. Strawberry guava threatens the future existence of all of these species and their habitat.

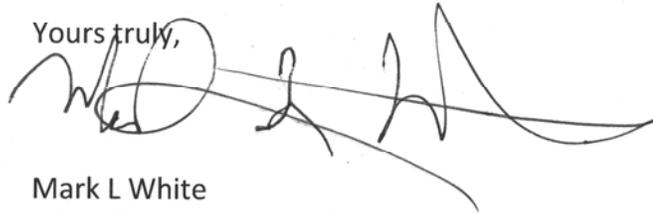
Strawberry guava is destroying the natural balance of our native Hawaiian forests and continues to cause landscape level extirpation of many native species, including the likely extinction of Maui County taxa within the next few decades. Recent research by University of Hawai'i scientists has demonstrated much lessened water storage and greater water evapotranspiration in invaded strawberry guava (*Psidium cattleianum*) forests versus our native 'ōhi'a (*Metrosideros polymorpha*) forests. The bottom line here is that strawberry guava forests store less water and lose more water to the atmosphere than our native forests.

Over 15 years, the Department of Agriculture and the U.S. Forest Service have conducted the in-depth research and analysis necessary to determine that this proposed host-specific biocontrol for strawberry guava will live only on strawberry guava, and it will not affect other plants or animals in Hawai'i. In test after test where this insect was placed directly on native plants like ohia or on agricultural plants like guava or papaya, it died. The insect only survived on strawberry guava. I am confident that this research is reliable and a good indication that this biocontrol will help slow the continued spread of strawberry guava into native forests without harming any other plants or animals in Hawaii.

The notion that this insect will evolve a new relationship with Hawaii's native or agricultural plants is simply a misunderstanding. It takes millions of years for specialized biological relationships like this to develop. With the extensive testing done on this biocontrol the risk is higher that it will fail than it will succeed. In the years before the 1960s, anyone could bring any plant, animal or insect into Hawaii and release it with no legal or other consequences. Fortunately, today we have extensive laws and regulations preventing random introduction and requiring extensive testing to ensure safety. In fact, biocontrols are so carefully studied and tested that the risk is higher new biocontrols will fail than succeed. Even if this new tool is completely successful and strawberry guava grows more slowly, it will still be in our forests; its wood and fruit available for harvest. But with this tool, our native forests will have a fighting chance of surviving and even thriving.

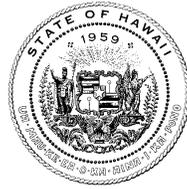
I fully support and encourage the release of the carefully tested strawberry guava (*Psidium cattleianum*) biological control agent, *Tectococcus ovatus*, by the U.S. Forest Service.

Yours truly,

A handwritten signature in black ink, appearing to read 'Mark L White', written over a horizontal line.

Mark L White
290 Pa'ani Place
Paia, Hawaii 96779

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Mark White
290 Pa'ani Pl.
Pa'ia, HI 96779

Dear Mr. White:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



NATIONAL TROPICAL BOTANICAL GARDEN

Chartered by Congress to Create a National Resource in Conservation, Research, and Education

July 22, 2010

Hawaii Department of Agriculture - [via email to: hdoa.ppc@hawaii.gov](mailto:hdoa.ppc@hawaii.gov)
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814

Division of Forestry and Wildlife/DLNR
1151 Punchbowl St., Rm. 325
Honolulu, HI 96813

Re: Supportive Testimony for the Biocontrol of Strawberry Guava

Aloha mai kākou apau. I am writing as the Chair of the Kaua‘i Watershed Alliance (KWA) and the Director and CEO of the National Tropical Botanical Garden (NTBG) and am in full support of the effort to control Strawberry Guava by the release of the Brazilian scale insect. The scale is a natural control agent and represents a good safe option for control of this invasive species.

Our native forests are priceless resources that are currently threatened by many invasive species - a handful of which have the ability to dramatically transform the health of these fragile ecosystems. Strawberry Guava, also known locally as Waiawī, is one of these transformational invasive species that is able to out compete native species for water, spaces and nutrients. Once established, Waiawī turns diverse native forests to monotypic stands and drastically reducing the biodiversity of the area.

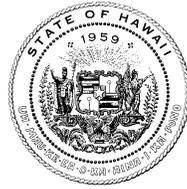
The Draft Environmental Assessment for the release of the biocontrol agent clearly documents the negative impact of Waiawī across the state and the limited risks associated with the release of the Brazilian scale insect. As a community we have to weigh the risk of introducing this biocontrol agent with the risk of not introducing it and allowing Waiawī to continue to destroy our native lowland forests. Biocontrol is not, and should not, be the answer to every pest problem but in the case of ecosystem transforming species like Waiawī we have to seriously consider the use of this tool now that it has been fully researched by the best science we have available today. I have reviewed the DEA and supporting science and support the release of this biocontrol agent along with the continuation of all of our other methods for controlling the spread of this noxious plant.

Mahalo for considering the importance of this DEA and the long-term impact controlling Waiawī will have on the health of our native forests.

Me ke aloha no,

Chipper Wichman
Director and CEO – National Tropical Botanical Garden

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Chipper Wichman, Chair
Kaua'i Watershed Alliance
Director, National Tropical Botanical Garden
3530 Papalina Rd.
Kalaheo, HI 96741

Dear Mr. Wichman:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 22, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts, including yours on behalf of native species and ecosystems, more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

From: Connie Wickware
Date: July 21, 2010 11:27:57 AM HST
To: doa.ppc@hawaii.gov
Subject: strawberry guava scale

Dear DOA

Here are copies of emails I've already sent to you. Maybe a new group of people are reading them at this point.

We have two strawberry guava specimens in our backyard, and we would be very upset if something happened to them.

It is not illegal to grow strawberry guavas in Hawaii. They are a common landscaping tree, and are readily available at plant nurseries.

We live in Kalihi Valley. Would the scale come into our backyard and kill our beloved plants? We keep them trimmed, by the way, and I don't see them choking out any native species. They are not spreading at all in this urban neighborhood situation.

Although an invasive species, there is no doubt strawberry guavas are a handsome and healthy tree. Scale insects that maim and stunt growth to strawberry guavas will make the ones that do exist, ugly and unhealthy. Is the introduction of another non-native species really the best solution in this case? How about culling the strawberry guavas; cutting them down where they are doing the most harm? Too expensive? But how about the jobs that would be generated?

Our family obviously has a vested interest in this issue, because we don't want to lose the two strawberry guavas on our property, and I do understand the importance of protecting Hawaii's precious ecosystem, but I would also hate to see such a beautiful and obviously vigorous tree taken away from Hawaii's urban landscape.

We also have 4 pineapple guava trees in our front and back yards, prominent landscaping trees, even though they only reach to about 8 feet when mature. Both guava trees. Hum? How do you know that pineapple guavas are not susceptible to the strawberry guava scale? I read that 100 species of plants were tested, only about 50 of those tests were done in the Hawaii setting. Do you actually believe this is a large, all-inclusive test group?! It's a very limited test group. Essentially, the introduction of this scale insect into Hawaii's habitats is the experiment.

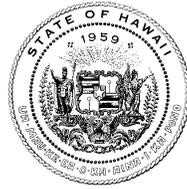
Since it is not against the law to purchase or grow strawberry guavas, will private citizens be reimbursed for the intentional destruction of our property? I would expect to be reimbursed with a comparable quality tree (unfortunately, I can think of none as well adapted, pest/blight/maintenance-free, and beautiful, here in Hawaii), same size (I have one in our backyard that is at least 25 years old), and planted, a;; at DOA's expense.

Why not take all those funds and just pay people to cut down the trees in the most crucial areas on public lands?

By the way, the, maybe 20, native Hawaiian plant species I have planted on our property are not at all bothered by my strawberry guavas.

Connie Wickware
Kalihi Valley,
Honolulu, Oahu

+++++



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Connie Wickware
Kalihi Valley, Honolulu

Dear Ms. Wickware:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 21, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comment on scenic impacts of the biocontrol, please see FAQ No. 9. Regarding manual clearing, see FAQ No. 4. For information on the testing of the scale insect, see No. 6, and regarding your comment about the threat strawberry guava poses to the environment in Hawai'i, please see FAQ No. 1. As several of your concerns differed from the list, our responses to those specific comments follow. Please note that the page numbers refer to detailed discussions in the Draft EA which is available in The Environmental Notice archives of 2010-06-23 at <http://hawaii.gov/health/environmental/oeqc/index.html>.

1. Release would violate private property rights.

First of all, please note that the biocontrol agent will not by any means eliminate strawberry guava, but only reduce its ability to compete with native plants, which, unlike strawberry guava, usually have a number of native and introduced insect predators. There will continue to be strawberry guava and any party interested in using strawberry guava for any purpose will continue to be able to do so. There are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties (p. 54). For example, the construction of new infrastructure such as highways, bridges, ports and airports invariably bring increases in noise, impacts to scenic vistas, and minor increases in air pollution. When a fire threatens a community or a special ecological area, firebreaks must be built that alter vegetation and change views. Only when impacts reach significant levels is compensatory mitigation to private property owners appropriate. Without this principle, the State would be unable to undertake its vital functions. The State of Hawai'i has a duty to protect trust resources such as threatened and endangered species, which in this case carries with it minor sacrifices on the part of those who want to maximize the fruit production of this strawberry guava, a highly invasive species that is devastating native forests and the natural and cultural resources they contain.

2. Will Tectococcus ovatus attack pineapple guava as well?

Extensive laboratory testing in Brazil, Hawai'i and Florida evaluated susceptibility of a wide variety of guavas and relatives to the scale insect (Appendix 1). Pineapple guava, *Acca (Feijoa) sellowiana*, was tested in Florida and was not a suitable host for the insect. The evidence also includes more than 15 years of observations of the insect populations developing on strawberry guava in close proximity to other guava trees at field sites in

Brazil. In its native country where *Acca selowiana* also originates and is common, *T. ovatus* has never been found on any agricultural crops or ornamental plants, only strawberry guava and one closely related plant (*Psidium spathulatum*, an uncommon wild tree found only in southern Brazil). All evidence indicates that this insect has an extremely narrow host range that only includes strawberry guava in Hawai'i.

3. *The government could be held liable for damages to trees on private property.*

While the leaf galls on strawberry guava are effective at limiting growth and fruiting, they are only visible from close-up, leaving a still attractive tree. Complete defoliation is very unusual in Brazil. The subtlety of impact of the scale insect on strawberry guava is such that most residents would be unaware that the insect is feeding on individual strawberry guava trees. Considering these factors, it is highly unlikely that the proposed action would lead to the scale of scenic impacts that would devalue private property. Conversely, there might be minor increases in property values through the reduction in fruit pests (fruit flies and beetles associated with strawberry guava), which gardeners and farmers may value. As discussed in the issue of private property rights, there are many instances in which the State must balance the needs of its entire population and the State's resources as a whole with impacts to private properties. It is difficult to definitively conclude that the reduction in fruiting and vigor of strawberry guava, along with the appearance of leaf galls on the plant, would not in any way affect the value of properties with strawberry guava, whether negatively (through decreased scenic value) or positively (through reduction in fruit pests). However, any such differences would be expected to be slight. In any case, the significant public benefits from this action must be considered as a mitigating factor outweighing these minor and speculative impacts.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,



Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Testimony regarding the release of the scale for strawberry guava.

Aileen Wung Yeh

July 20, 2010

I am FOR the release of the scale on the island of Hawaii.

I was born and raised on the island of Hawaii. My family has raised cattle in the Glenwood area for over 60 Years.

I am also a member of the Hawaii Forest Industry Association and a board member of the Hawaii Forest Institute, but I speak for myself as an individual, a land owner, a conservationist, and a rancher.

Most of our pastures were once fairly open, with islands of native species such as ohia, olapa, hap'u, kawau, ohelo, lobeliads and painu with a scattering of loulu palms.

Over the years, the growth and spread of strawberry guava has made it difficult to keep pasture lands open. It has shaded out the pasture grasses, reducing the amount of feed available to the cattle. It has encroached into the native areas. Bulldozing of the strawberry guava would mean bulldozing the native vegetation which is something we would like to avoid.

Many have suggested cutting and painting the strawberry guava. This might succeed on a small area, but when we are dealing with hundreds of acres, it is unfeasible for the small landowner that may be land rich but cash poor. We have spent over \$10,000 on a 50 acre piece, in time, money, and chemicals over the last 5 years trying to do basal bark spray, as well as cutting and spraying, and we still have regrowth. When the cattle and pigs eat the guavas, they spread them all over the pasture, and little seedlings sprout all over. The invasion of *Rubus ellipticus* makes it even more difficult to get to the strawberry guava to spray it or cut it.

In times of heavy fruit yields, our horses have gotten colic from eating the fruit. Cutting of the thickets of strawberry guava around understory plants might expose the native plants to too much sunlight too quickly, and more prone to being eaten by cattle or pigs.

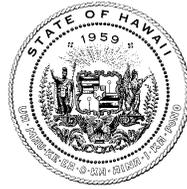
I take issue with the hunters that say they like to hunt in the strawberry guava areas. From my experience, they don't like to go into the forest because it is too difficult to walk through the strawberry guava thickets, and prefer to trespass into the open pastures to chase the pigs.

Studies have indicated that the release of the scale would help to lessen the fruiting, and slow down the spread of the guava, lessen the fruit fly load, and slow down the spread of strawberry guava into the native forest areas. I feel we should release the scale, and would be willing to let them go in our pastures.

Respectfully submitted,

Aileen Wung Yeh, 942 W. Kawaihani St., Hilo, HI 96720. Ph 936-2671. Email ayeh@hawaii.rr.com

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Aileen Wung Yeh
942 W. Kawaihina St.
Hilo, HI 96720

Dear Ms. Yeh:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

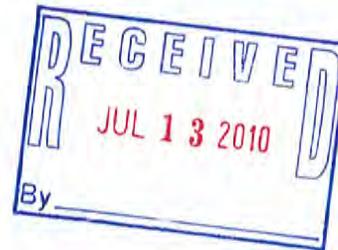
Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture

Jill Yoshicedo, DVM
1725 Akaakoa Street
Kailua HI 96734

July 11, 2010

Hawaii Department of Agriculture
Plant Pest Control Branch
1428 S. King St.
Honolulu HI 96814



To Whom It May Concern:

I am writing to express my hope that you will NOT introduce the non-native Brazilian insect *Tectococcus ovatus* into Hawaii as a measure of biological control against the strawberry guava plant. While I am also grieved and concerned by the changes to many native Hawaiian forest ecosystems in part due to the strawberry guava plant, I do NOT agree that non-native species introduction is an appropriate or responsible action in controlling this pest.

As a veterinarian, I am trained not only in the medical sciences, but also in biological and ecological interests such as conservation medicine, a field that integrates environmental health, human health, and animal health. It is from this perspective and a desire to maintain the integrity of what remains of Hawaii's unique ecosystem and biodiversity that I strongly DISAGREE with the purposeful introduction of yet another non-native species into our ecosystem.

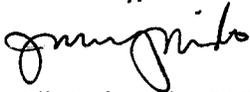
Although varying reports may claim that this non-native species introduction would have little impact on our ecosystem, NO amount of research can GUARANTEE that the non-native species will target ONLY the strawberry guava plant and leave our other native or agriculture plants alone. Will the insect find Hawaii's other non-tested flora easier targets than the strawberry guava? What plants will the insect adapt as hosts if strawberry guava is eradicated or population decimated? Do we have the appropriate predators to keep this non-native insect population under control? With our unique ecosystem, there is little room for experimentation and failure with biological control.

Biological control measures typically FAIL to control the target species (in this case, the strawberry guava plant) and often spin off to affect a myriad of other ecological facets that were not previously considered. Remember the good intentions of those who purposely introduced the mongoose and cane toad to Hawaii? Auwe.

As an alternative to introducing more non-native species to the island, I would support continual manual and herbicidal control of the strawberry guava plant. Informing and involving local communities in managing the invasive species population has been shown to be highly effective in implementing long-term successful solutions against invasive species. Additionally, we should ideally focus spending on increasing our surveillance and efficacy in preventing future introductions of non-native species before they become established as invasive species in the islands.

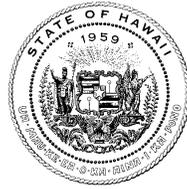
I believe Hawaii's ecosystem is too valuable and fragile to serve as another biological control experiment. The cost of failure is too high; we could easily be trading one invasive species for two invasive species. Please RECONSIDER your proposal and DO NOT introduce another non-native species, the Brazilian insect *Tectococcus ovatus* into Hawaii.

Sincerely,

A handwritten signature in black ink, appearing to read "Jill Yoshicedo".

Jill Yoshicedo, DVM
Kailua, HI

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Jill Yoshicedo, DVM
1725 Akaakoa St.
Kailua, HI 96734

Dear Dr. Yoshicedo:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 11, 2010, on the Draft EA. Along with this letter we have enclosed a FAQ-type listing of the most common issues of concern to some of our commenters and our responses. In regard to your comments about the scale insect targeting other species, please see FAQ No. 5. Regarding your general concerns about biocontrol, see No. 3. As for your comment about manual eradication of strawberry guava, please see No. 4.

You assert that "biological control measures typically fail to control the target species...and often spin off to affect a myriad of other ecological facets that were not previously considered," and then go on to cite the mongoose and cane toad. Neither is an example of biocontrol as it has been practiced for the last 40 years. Today, biocontrol introductions are based on extensive research and testing. Animals like mongoose and cane toad, which feed on a broad range of prey, would never be considered for biological control. The only acceptable organisms are highly host-specific – those that have a single host or very narrow range of hosts and that are unable to survive on other species. Biocontrol efforts in Hawai'i in recent decades have been highly successful and have contributed to management of many serious environmental pests. The latest success story is a biocontrol introduced to save the wiliwili tree, which was on the verge of extinction from an alien gall wasp. To do nothing about strawberry guava – or to defer to the idea of manual control methods that would cost many billions of dollars and will never be implemented – is to consign the precious Hawaiian ecosystems to ever more rapid destruction.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in black ink that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



Pacific Rim Conservation
Honolulu, HI, 96822
www.pacificrimconservation.com

July 20, 2010

Dr. Neil Reimer
Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 S. King Street
Honolulu, HI 96814
hdoa.ppc@hawaii.gov

RE: Support for the Hawai'i Department of Agriculture's Proposed Alternative in the Draft Environmental Assessment "Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands".

Dear Dr. Reimer

I am writing in support of the proposed alternative which would grant a permit for the release of *Tectococcus ovatus* as a natural control agent of strawberry guava (*Psidium cattleianum*). Strawberry guava is one the worst threats to watershed health, Hawai'i's unique natural heritage and endemic flora and fauna and I feel that releasing a natural control for strawberry guava is necessary to protect Hawai'i's native forests.

On the island of O'ahu, strawberry guava thickets carpet vast swaths of the Ko'olau and Wai'anae Ranges. I have been in dark thickets of strawberry guava while doing forest bird surveys and witnessed it covering hundreds of acres where nothing else grows and the ground beneath is bare and vulnerable to erosion. Research has shown that in areas where strawberry guava has invaded native forests, there is a 27-50% reduction of water from our soils, streams, and groundwater systems. On top of this, strawberry guava provides fruit for feral pigs and rats, both of which prey directly on the endangered Oahu Elepaio.

It is important to understand that in Brazil, where strawberry guava is native, it does not grow in thickets as it does in Hawai'i. Strawberry guava grows sparsely in Brazilian forests.

O'ahu's forests should be dominated by native species such as 'ōhi'a (*Metrosideros polymorpha*) or koa (*acacia koa*), but instead they are dominated by strawberry guava. It

reproduces in such numbers that 'ōhia, koa, and any other native seeds never have a chance to sprout.

On O'ahu, our forests are so degraded that 'ōhi'a and koa are not easily seen. To find it often requires a hike up through dense stands of strawberry guava. Today, native forest can only be found in the upper elevations of the Ko'olau and Wai'anae Ranges. However, those areas are not safe. Strawberry guava trees grow at the summits of both ranges and will soon spread.

Natural predators are an effective tool to reduce the amount of damage invasive species in Hawai'i do. Introducing a natural predator of panini cactus reduced its numbers, opening up pastures on the Big Island and making them usable again. When Hawai'i's native wiliwili trees were threatened with extinction in 2005 due to the accidental introduction of the *Erythrina* gall wasp, the introduction of the even smaller *Eurytoma* wasp decreased the populations of the gall wasp, allowing wiliwili to make a comeback.

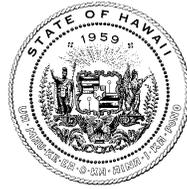
T. ovatus has been tested for more than 10 years and shown to reside exclusively in strawberry guava. Natural resource managers have done their best to manage strawberry guava, but it has been in Hawai'i too long and land managers cannot keep up with it. *T. ovatus* will level the playing field. It will not eradicate strawberry guava or even stop it completely. That is not the goal of releasing a natural control. *T. ovatus* will slow the spread of strawberry guava, giving the native forest a chance to compete. Less strawberry guava seedlings will allow in some sunlight and give 'ōhi'a and koa seeds a chance to sprout.

Like Hawai'i's language and culture, Hawai'i's forests are unique, the species in them are found nowhere else in the world. These species are being lost to strawberry guava. Releasing strawberry guava's natural control is the proper and responsible action to take to protect our forests for future generations to enjoy. Thank you for the opportunity to comment.

Sincerely,

Lindsay Young, Ph.D.
Wildlife Biologist

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Lindsay Young, Ph.D.
Wildlife Biologist
Pacific Rim Conservation
Honolulu, HI 96822

Dear Dr. Young:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 20, 2010, on the Draft EA, indicating your support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture



CONSERVATION COUNCIL FOR HAWAI'I

July 23, 2010

Hawai'i Department of Agriculture
Plant Pest Control Branch
1428 South King Street
Honolulu, HI 96814

Comments on Draft Environmental Assessment – Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands, June 2010

Aloha. The Conservation Council for Hawai'i supports the proposed action and the environmental release on State land in Hawai'i of the scale insect from Brazil, *Tectococcus ovatus*, for biological control of the invasive strawberry guava, *Psidium cattleianum*. Slowing down the production of strawberry guava using the scale will allow land managers to reduce strawberry guava in sensitive habitats for unique Hawaiian plants and animals – including endangered species – watersheds, areas that support traditional Hawaiian practices, and recreation areas. Controlling strawberry guava will protect water quality in streams and the nearshore marine environment, and it will help protect Hawai'i agricultural industry by reducing a major source of fruit flies that attack our crops.

The invasion of strawberry guava in native Hawaiian forests is a serious environmental and economic matter. The no-action alternative will ensure the continued loss of native forest and its values, and is unacceptable. Please approve the EA and move forward with this important program. Thank you for considering our comments.

Sincerely,

Marjorie Ziegler

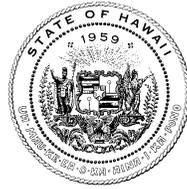
c: Hawai'i Department of Land and Natural Resources



Hawai'i's Voice for Wildlife – Ko Leo Hawai'i no na holoholona lohiu

Telephone/Fax 808.593.0255 • email: info@conservehi.org • web: www@conservehi.org
P.O. Box 2923 • Honolulu, HI 96802 • Office: 250 Ward Ave., Suite 212 • Honolulu, HI 96814
President: Maura O'Connor * Treasurer: Kim Ramos * Secretary: Douglas Lamerson
Directors: Rick Barboza * Madelyn D'Enbeau * Maka'ala Ka'aumoana * Hannah Springer
Executive Director: Marjorie Ziegler

NEIL ABERCROMBIE
Governor



RUSSELL S. KOKUBUN
Chairperson, Board of Agriculture

JAMES J. NAKATANI
Deputy to the Chairperson

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawai'i 96814-2512

November 1, 2011

Marjorie Ziegler
Conservation Council for Hawai'i
P.O. Box 2923
Honolulu, HI 96802

Dear Ms. Ziegler:

Subject: Comment to Draft Environmental Assessment for Biocontrol of Strawberry Guava by its Natural Control Agent for Preservation of Native Forests in the Hawaiian Islands

Thank you for your comment letter dated July 23, 2010, on the Draft EA, indicating the Conservation Council's support for the project, which is meant to benefit native species conservation, watersheds, and agriculture. We agree that biological control has a crucial role to play in conservation of our state's unique natural environment. Although it will not replace the hard work of removing strawberry guava from areas already invaded, the proposed biocontrol agent would provide a critical tool for managing this invasive plant and making other efforts more sustainable. As you mention, this project has potential benefits for controlling agricultural pest fruit flies, particularly the oriental fruit fly. In combination with other tactics developed by the USDA's Agricultural Research Service, University of Hawai'i and partners, biocontrol of strawberry guava is expected to greatly enhance our ability to manage pest fruit flies.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at 808-973-9522.

Sincerely,

A handwritten signature in cursive script that reads "Neil Reimer".

Neil Reimer, Ph.D.
Plant Pest Control Branch Chief
Hawai'i Department of Agriculture