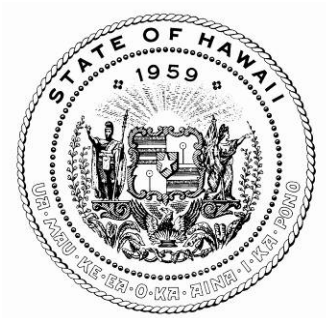


REPORT TO THE TWENTY-FIFTH LEGISLATURE
REGULAR SESSION OF 2009

BUDGETARY AND OTHER ISSUES REGARDING INVASIVE SPECIES



Prepared by:

THE STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE

In response to Section 194-2, Hawaii Revised Statutes
and
Section 28 of Act 158, Session Laws of Hawaii, 2008

October 2008

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BUDGETARY AND OTHER ISSUES REGARDING INVASIVE SPECIES

PURPOSE

Chapter 194, Hawaii Revised Statutes (HRS), Invasive Species Council, establishes the interagency Hawaii Invasive Species Council (HISC), determines its composition and responsibilities, and gives its member agency's special abilities to enter private or public property to control invasive species (Appendix 3). HISC's purpose is to coordinate and promote efforts that prevent, eradicate or control invasive species and maintain an overview of the issues related to invasive species in Hawaii. HISC coordinates the State's efforts to stop the introduction and spread of invasive species in Hawaii. This report provides an update on progress toward that goal and meets the reporting requirement of Section 194-2, HRS, to annually report to the Legislature on budgetary and other issues regarding invasive species. The headings used in this report are taken from the duties outlined in Section 194-2, HRS, and the HISC Strategy 2008-2013.

Additionally, Section 28 of Act 158, Session Laws of Hawaii (SLH) 2008, requires the Department of Land and Natural Resources (DLNR) to prepare each year, a report on the statewide strategic plan for the invasive species prevention, control, research, and outreach partnership program, and identification of the short- and long-term needs of the program with specific performance outcomes; provided further that the report shall identify all appropriation transfers (state and non-state) to other departments, including a detailed breakdown of matching non-state funds or equivalent services received by source, including dollar amounts, and how the funds expended addressed the needs of the strategic plan and the strategic plan's performance outcomes.

BACKGROUND

Formal efforts to create a comprehensive invasive species program began with the Coordinating Group on Alien Pest Species (CGAPS), voluntarily formed in 1995 and consisting of senior staff in numerous federal, state, county, and private entities actively involved in invasive species prevention, control, research, and public outreach programs.

The 2003 State Legislature authorized the creation of HISC under Act 85, SLH 2003, and stated "the silent invasion of Hawaii by alien invasive species is the single greatest threat to Hawaii's economy, natural environment, and the health and lifestyle of Hawaii's people and visitors." Hawaii is one of the first states in the Nation that recognized the need for coordination among all state agencies, at a cabinet level, that have responsibility to control invasive species on the ground, as well as regulate or promote the pathways in which invasive species can gain access into the State. In 2006, Act 85, amended by Act 109, SLH 2006, became permanent law in Chapter 194, HRS.

HISC members include the chairs or directors of the DLNR, Agriculture (HDOA), Business, Economic Development, and Tourism (DBEDT), Health (DOH), Transportation (DOT), and the President of the University of Hawaii (UH). Additionally, directors from the Departments of Hawaiian Home Lands (DHHL), Commerce and Consumer Affairs (DCCA), and Defense (DOD) have been invited to participate. HISC provides the institutional framework for leadership and coordination for a statewide invasive species prevention and control program.

DLNR is the administering agency for HISC.

In 2006, the inclusion of eight members from the Legislature, to serve in an ex-officio and non-voting advisory capacity provided a stronger link to the Counties. One member from each legislative body, four senators and four (House) representatives represent their respective counties and help guide the decisions of HISC.

Lead agencies chair interagency working groups meetings that focus on different program areas; DOA chairs the Prevention Working Group, DLNR chairs the Established Pests Working Group, UH chairs the Research and Technology Working Group, DBEDT chairs the Resources Working Group, and DOT chairs the Public Outreach Working Group.

COORDINATION OF INVASIVE SPECIES EFFORTS

Summary of Key HISC Activities

Over the past calendar year, HISC met twice to review and approve actions related to fulfillment of responsibilities identified by Chapter 194, HRS, and now detailed under the updated HISC Strategy 2008-2013. <http://www.hawaiiinvasivespecies.org/hisc/strategicplan.html>

HISC Goals: Coordinate invasive species management and control programs for county, state, federal and private sector entities by developing a structure for cooperators to work together to share resources and responsibilities to address specific invasive species issues. More detailed goals provided in the HISC Strategy 2008-2013.

HISC Measures of Effectiveness

- Advice and recommendations to Governor or Legislature. **Detailed in this report.**
- Reports to the Legislature regarding invasive species. **This report.**
- Approval of annual budget. **This report, see HISC Budgetary Matters below.**
- Meeting reports (including working groups). See list of meetings below and <http://www.hawaiiinvasivespecies.org/hisc/>
- Attendance at meetings of member and collaborating agencies. **This report** and <http://www.hawaiiinvasivespecies.org/hisc/>
- Agency adoption of innovative projects, rules and policies against invasive species. **This report.**
- Number of new invasive species detected at ports of entry. **This report.** See Prevention below.
- Names and numbers of priority pests threatening Hawaii. **This report, see HISC working group areas of accomplishment, and the overview of the invasive species problem in Hawaii below.**
- Working group goals achieved. **This report, see HISC working group areas of accomplishment below.**
- Results from a public awareness survey. **This report.** See Public Outreach below.

HISC Meeting Resolutions

On July 9, 2008 HISC approved the following resolutions:

1) *Adopted the HISC Strategy 2008-2013, following with some minor edits. The strategy is available at: <http://www.hawaiiinvasivespecies.org/hisc/strategicplan.html>*

The Strategy provides the framework for a statewide invasive species prevention, control, research and public outreach program. The Strategy is more concise and better documents the HISC's goals, legal mandates, and takes into account reviews carried out by each of the working groups. This replaces the previous interim strategic plan.

2) *Agreed to remove the HISC interagency working group*

After reviews of the HISC Strategy in 2008, it was concluded that currently active interagency working groups, namely the prevention, established pests, public outreach, resources and research and technology, are positioned to deal with any invasive species issue that may come up. The Interagency Working Group which was to be chaired by DOT has not met since the HISC working groups were formed in 2003. This is because all pertinent issues are easily covered within the other working groups for which the participation of all member agencies is expected. In addition, the main HISC council meeting is an appropriate forum for broader interagency issues to be addressed.

3) *HISC approved a recommendation that state agencies conducting planting operations request Hawaii Pacific Weed Risk Assessment (HPWRA) scores, when available, as one of the tools to assist decision makers in determining whether to plant a species. For species that have scored as potentially invasive in Hawaii, this information should underscore the need for containment plans or remediation efforts if they become necessary. HPWRA and outreach staff should work with state and county agencies to identify the ones with planting guidelines, seeking to gain their support of this recommendation and informing them of the WRA services we provide.*

The purpose of the WRA is to identify high-risk species (likely invasive pests plants), allowing the State to make informed decisions that will reduce the economic and ecological harm caused by invasive plants in Hawaii and on other Pacific islands. WRA is a pro-active tool to identify plants that pose the highest risk of causing ecological or economic harm. Many introduced plants provide significant benefits to humans, and such benefits also need to be considered when making planting or importation decisions.

HPWRA uses 49 questions to obtain a score for each species. A high scoring plant poses a high risk of becoming an invasive pest in Hawaii and other Pacific islands. It is based on the species' biology, geographic origin, and pest status elsewhere, as well as published information on the species' behavior in Hawaii.

Several systems were examined for use in Hawaii. The Australian AQIS system was most promising after simple modifications. Based on test runs with nearly 200

plant species, the HPWRA system correctly identified approximately 95% of serious invasive plants in Hawaii and other Pacific islands. The system correctly classifies 80-85% of non-pest plants.

The HPWRA system is an objective, effective, transparent tool for identifying and screening out invasive plants. If HPWRA ratings were used for importation and planting decisions, Hawaii's invasive plant problems could be greatly reduced.

4) HISC issued a statement of support for scientifically researched, regulated and approved biocontrol as a tool for combating invasive species.

Biological control is an important tool for controlling alien invasive species that cause harm to Hawaii's economy and environment. Effective control of many harmful pests cannot be achieved with traditional mechanical or chemical tools because of their abundance and large extent. In these severe cases biological control is the only option for long-term, cost-effective control. Biocontrol never eliminates a species entirely but reduces the damage caused by the pest.

Classical biological control begins with exploring the natural enemies of the target pest in its native range. Potential candidate agents are studied for host range, impact on target host, and amenability to rearing in the laboratory. When this process identifies a promising candidate it is studied more intensely in local containment facilities to document host specificity and other important biological characteristics.

Permitting agencies (United States Department of Agriculture (USDA)/ Animal and Plant Health Inspection Service (APHIS) and HDOA) must approve science-based applications before a biocontrol agent is released into the environment. Since this regulatory process was put into place in the 1970s, no harmful impacts have been caused by biocontrol introductions, while successful control has been achieved for many targeted pests.

The above process takes many years. Currently a lack of facility space severely limits the development of biocontrol agents in Hawaii. The HDOA and the USDA-Forest Service (FS) are the only entities possessing certified containment facilities to conduct the necessary studies, and these facilities are insufficient to meet the current demand for research space.

The introduction of an insect to control waiawi, or strawberry guava (*Psidium cattleianum*), has recently been proposed by the USDA-FS. Waiawi is an invasive tree introduced in 1825 that has taken over large areas of Hawaii's watersheds and threatens remaining native forests. This insect shows promise for slowing the spread of waiawi and making it easier to control using chemical and mechanical means. The necessary release permits have been issued and an environmental assessment is being conducted. Several individuals and groups have expressed

concern about this introduction. The State is conducting additional outreach to improve public understanding of this important project.

5) HISC supported a statewide outreach effort to distribute information and address community concerns with respect to the Tectococcus biocontrol Environmental Assessment process.

Strawberry guava invades native forests — Introduced to Hawaii from Brazil in 1825, strawberry guava is an invasive species that many enjoy. Some people eat the fruit as a snack, use it to make jam, or use the wood for smoking meat, and more. However, like several non-native species, its damage may outweigh its utility. Strawberry guava has no natural enemies or competitors in Hawaii. It forms dense thickets that replace native Hawaiian plants and also damages the watershed services that diverse forests provide. Its spread over thousands of acres is beyond the possibility of control by existing methods. These are just some of the reasons why there is a public conversation about the proposed introduction to Hawaii of a scale insect that is the natural population control of strawberry guava in Brazil. Outreach seeks to help Hawaiian residents learn more about strawberry guava and biocontrol and the facts and fiction about strawberry guava control. Apart from impacts to native plant species through competition for space and nutrients, strawberry guava impacts the availability of freshwater in our watersheds.

UH Professor Thomas Giambelluca, in a collaborative study, used state-of-the-art sensing equipment to measure energy, carbon, and water exchanges at a native forest site and at a site where strawberry guava has invaded. The data showed that the invaded site has much higher evapotranspiration (ET) (i.e., much more water is lost to the atmosphere, as compared with the native forest site). The ET of the invaded forest is 27% higher than that of the native forest on average. This translates into a huge loss of water from our soils, streams, and groundwater systems in areas where strawberry guava has invaded native forests. Increased ET can be directly equated with reduced water available for municipal water supply systems and irrigation. The reduction in surface and groundwater resources will have serious economic, as well as environmental, impacts. Measurements of the higher rates of water loss associated with this invasive species underscore the need to immediately employ the most effective methods to reduce strawberry guava infestation and to prevent further invasion by this species in Hawaiian forests.

On September 3, 2008, HISC approved a spending plan for Fiscal Year (FY) 08 for a budget of \$4,000,000 that addresses the four interrelated plan components:

- Prevention \$573,400.
- Response and Control \$2,092,700.
- Research and Technology \$500,000.
- Public Outreach \$312,200.
- HISC Support (includes central services fee and contingency fund) \$521,700.
- More detail is provided in HISC Budgetary Matters.

The working group chairs received more than \$5.1 million in proposals. Many projects proposed to improve invasive species management in Hawaii were turned down or outputs reduced to balance the budget within the funds allocated by the Legislature.

HISC working groups were also active in FY08:

- Reviewed and modified the HISC Strategy 2008-2013 including measures of effectiveness and goals.
- Considered and approved budget and project proposals for 2008-2009.

HISC and working group meetings held between November 2007 and November 2008

| Meeting | Date | Lead Agency | Main issues |
|-----------------------------|--------------------|-------------|--|
| 1. Resources* | January 11, 2008 | DBEDT | HISC Strategy Review |
| 2. Established Pests* | February 25, 2008 | DLNR | HISC Strategy review, Invasive Species Committees work on agricultural pests, the need for an outbreak emergency response fund |
| 3. Research and Technology* | March 3, 2008 | UH | HISC Strategy Review |
| 4. Public Outreach* | March 3, 2008 | DOT | Review of grants awarded in 2008, introductions to new outreach staff on Maui and Oahu |
| 5. Prevention* | March 19, 2008 | DOA | HISC Strategy review |
| 6. Public Outreach* | May 27, 2008 | DOT | Peer learning, progress reports, budget FY08 |
| 7. HISC | July 3, 2008 | DOA/DLNR | HISC Strategy approval, removal of the HISC interagency working group, WRA, biocontrol, see resolutions described above |
| 8. Research and Technology* | July 23, 2008 | UH | proposals for research and technology initiatives in FY2009 from Bishop Museum and DOA |
| 9. Established Pests* | July 24, 2008 | DLNR | Budget recommendations for FY2009, Invasive Species Committees, DLNR and DOA presented proposals |
| 10. Prevention* | August 4, 2008 | DOA | Review of HISC-funded work in 2008 and recommendations for budget in FY2009, DOA, DLNR |
| 11. Resources* | August 14, 2008 | DBEDT | Formulation of a balanced budget the HISC budget FY09 see HISC Budgetary Matters below. |
| 12. HISC | September 3, 2008 | DOA/DLNR | Approval of budget recommendation made by the Resources Working Group FY 09 |
| 13. Public Outreach* | September 16, 2008 | DOT | Invasive species outreach projects, budget and spending FY08 and FY 09, public opinion and knowledge surveys and effectiveness of outreach |
| 14. Resources* | October, 15, 2008 | DBEDT | Change in funding environment, alternative sources of funds |

* All HISC working group meetings are interagency groups that meet to discuss issues related to invasive species management. Agenda and minutes are posted at: <http://www.hawaiiinvasivespecies.org/hisc/>

HISC WORKING GROUP AREAS OF ACCOMPLISHMENT

Accomplishments within the four HISC program areas: Prevention, Response and Control, Research and Technology, Public Outreach and Resources, as accomplished by the working groups established by the HISC Plan, are summarized below. Measures of effectiveness are taken from the HISC Strategy 2008-2013.

Prevention

Goals: (1) Review risks of pest/invasive species entry into the State; and (2) Implement measures and improve Hawaii's capacity to prevent the entry of new pests/invasive species with shared resources and shared responsibilities of all agencies. A more detailed list of goals for the Prevention working group is in the HISC Strategy 2008-2013.

The lead agency and chair for the Prevention Working Group (PWG) is HDOA.

The main prevention projects were:

- Implementation of a WRA system screening for plants led to the adoption of voluntary Codes of Conduct by Lyon Arboretum and Nursery Growers Association (see details below WRAs). This \$111,400 project was managed through DLNR in cooperation with the UH, Maui Invasive Species Committee and the Bishop Museum.
- DLNR's Division of Aquatic Resources (DAR) implemented a hull fouling and ballast water prevention and early detection program.
- DOH implemented a \$375,000 project to undertake West Nile Virus (WNV) surveillance, analysis, and improve response capabilities, through the purchase of traps, test kits, insecticide sprayers, insecticides, staff training, and computer hardware and software.
- DOA continued risk assessments that were funded in 2007 with intensive inspections of incoming cargo at the Honolulu International Airport (HIA) and maritime ports.

DAR Ballast Water and Hull Fouling Project

DAR implemented recently adopted Hawaii Administrative Rules, Chapter 13-76, relating to Non-Indigenous Aquatic Species. The unintentional introduction of alien aquatic species within the ballast water of ocean-going vessels is an internationally recognized threat to native ecosystems. The goals of these rules are to minimize the introduction and spread of alien aquatic species through ship ballast water into waters surrounding the Hawaiian Islands. The rules include guidance relating to the exchange of vessel ballast water prior to entry into the State, record keeping, and reporting of such activities. Compliance is being verified by reviewing required ballast water reporting forms sent in 24 hours prior to a vessel's arrival. This information enables the State to better assess the potential risk that an incoming vessel might contain alien species in its ballast water holds. Rules have been successful in allowing us to work with the shipping industry on ballast water management and limit the amount of ballast water discharged here.

DAR has been working with the Alien Aquatic Organism Task Force (AAOTF) to develop a comprehensive plan for preventing the introduction and dispersal of alien aquatic organisms found on the hulls of vessels into state waters. The Task Force includes representatives from state and federal agencies, shipping industries, the scientific community and non-government organizations. The State is in the process of reviewing and conducting studies, as well as looking at how others are managing this vector to get a clearer understanding of how to address the hull fouling issues in Hawaii. Currently, the State is addressing hull fouling events that would be considered high risk in introducing alien aquatic organisms to Hawaii. This includes following up on unexpected arrivals of vessels and working with the Navy to have their decommissioned vessel cleaned of aquatic invasive species before calling port in Hawaii.



Inspection of a ship's hull.

Rigorous aquatic alien species inspections are required of all vessels entering the Papahānaumokuākea Marine National Monument. This helps maintain the biosecurity of the largest conservation area in the Country and the largest protected marine area in the World. This includes underwater inspections of the hulls and sea chests, inspection of scientific gear and reviewing their ballast water management plans.

Adapting new technologies aid in monitoring of aquatic invasive species. The use of a remotely operated vehicles

and underwater pole cameras has been utilized to conduct underwater inspections. They are used to overcome many security and almost all safety issues when conducting underwater inspections. The State now has the capacity to keep divers out of the water when there are issues relating to water quality and/or the physical dangers of diving under large vessels or in a harbor habitat.

To fill the gap of early detection of aquatic invasive species, a capacity for early detection in the field teams of DAR was established. This included training on identification and collecting techniques of marine invertebrates and algae, and the acquiring of resources for documentation, identification, and preservation of unknown



A remotely operated vehicle for carrying out hull inspections where safety or security issues affect a diver's ability to do inspections.

species.

DOH WNV Surveillance, Prevention and Response

Objective: Continue implementation of effective surveillance, prevention, and control of WNV in Hawaii.

DOH continues to maintain and improve its current surveillance and prevention efforts, and establish greater capacity for responding if WNV is detected, to prevent the establishment of the virus in the State.

WNV poses a serious threat to Hawaii for several reasons. Given the tropical climate of the State, mosquito populations are present throughout all seasons, suggesting the potential for year-round transmission and prolonged human disease outbreak. Direct medical costs will be significant. With regards to wildlife, WNV will probably extinguish several endangered and endemic bird species in Hawaii, and may cause irreversible damage to the ecosystem. Additionally, Hawaii's economy is dependent on tourism, and its beautiful and safe environment is attractive to many visitors. Establishment of a mosquito-borne disease with no cure or prophylaxis currently available would have a negative impact on the state's economy.

DOH focuses its efforts in various areas:

1. Prevention activities continue to focus on source reduction, and source treatment with larvicides. Hawaii's mosquito species are container breeders, so reducing the number of water-collecting items from property reduces the breeding sites for the mosquitoes. Public outreach is critical for source reduction, and is discussed below. In addition, treatment of standing water with larvicides greatly enhances the reduction of the adult mosquito population, especially because standing water cannot be eliminated in many areas. Mosquito suppression is targeted so that, if the virus is introduced, there will not be a sufficient mosquito population to establish the disease cycle.
2. Educating the public is another significant activity for prevention of WNV. DOH shared WNV information through various venues, including health fairs, pet shows, neighborhood boards, association and group meetings, and the main public library. Other outreach activities included radio public service announcements, production and dissemination of informational brochures. Outreach efforts will continue with the first basic concept of informing the public of the need for mosquito control. DOH seeks HISC funds to maintain its level of effort.
3. Source reduction. DOH's Vector Control Program continues to implement strategies of reducing mosquito populations to a level of no more than 5 mosquitoes per trap per night, with surveying for breeding sites triggered by higher counts. Maintaining low mosquito counts has proven more difficult in some areas than others. Surveillance of an approximate radius of two miles of all major ports of entry, to detect and reduce breeding

sites continues. As a significant focus on prevention, DOH seeks HISC funds to maintain its level of effort in the area of source reduction. Ports of entry, both air and sea, will continue to be the primary focus of DOH mosquito surveillance and reduction.

4. Dead bird surveillance is accomplished through a contract established with Aloha United Way to operate a public hotline, accessible statewide, to report dead birds. Birds collected were tested by the RAMP (Rapid Analyte Measurement Platform) WNV Test, which is a rapid antigen detection assay. This is treated as a screening test, providing more rapid results. DOH needs the option to conduct live bird testing, and has developed such capabilities. DOH seeks HISC funds to increase its level of effort in dead bird surveillance, particularly in the area of RAMP WNV testing protocols.
5. Detection of WNV in a timely manner is critical in preventing the establishment of WNV or, if it is established, minimizing the public health impact in humans and animal species. Due to relative remoteness, efforts have been made to ensure that a full menu of WNV testing is available within the State. Protocols for performing enzyme-linked immunosorbent assays (ELISA) for WNV antibody in humans were established at the DOH's State Laboratory Division (SLD), and will continue to be used for the diagnosis of WNV human infections. SLD will continue to perform Real Time RT-PCR tests for the detection of WNV nucleic acid in human cerebral spinal fluid specimens, dead bird organs, and mosquito pools. DOH seeks HISC funds to increase its level of effort, primarily due to anticipated increasing requirements for dead bird and mosquito testing.

DOH WNV– Measures of Effectiveness

Vector Control Branch

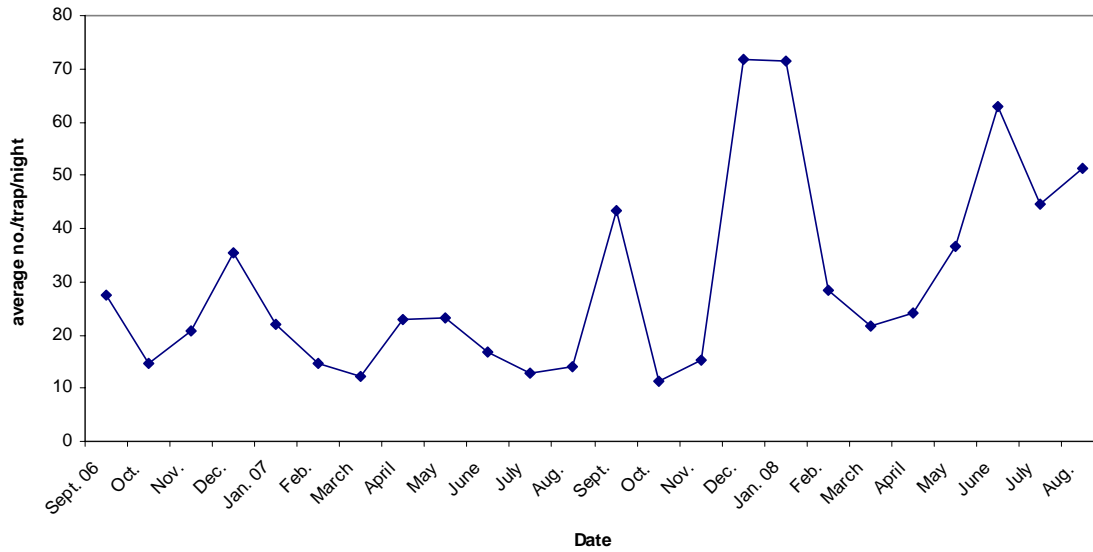
Goal: Enhance capacity to identify WNV in mosquitoes and dead birds, prevent establishment of WNV by maintaining a statewide integrated mosquito management (IMM) program, and maintain and provide resources for a ground-based response to WNV introduction.

Measures of Effectiveness:

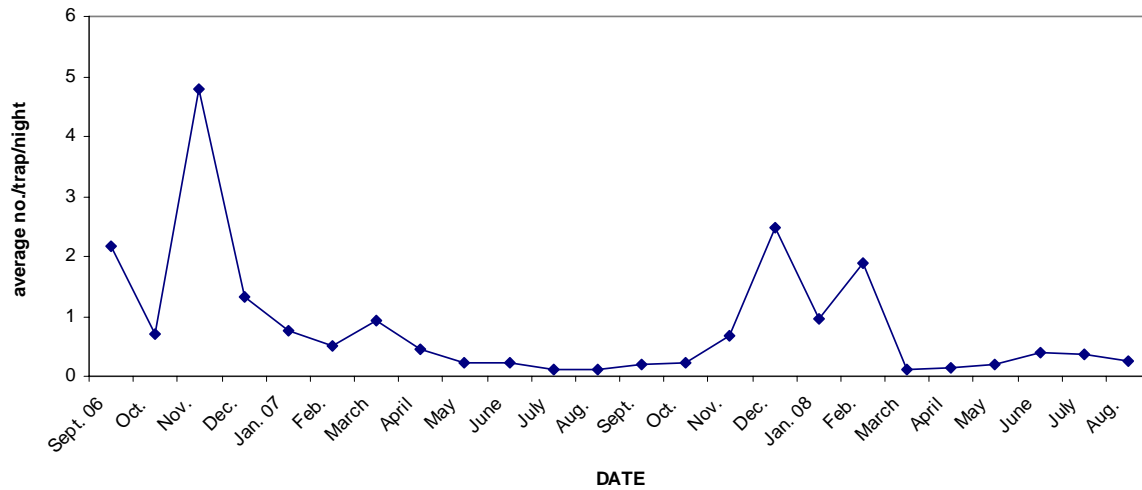
| Objective | Measure | Detail |
|---|---|---|
| Maintain gravid traps at major ports of entry for collection of mosquitoes | Number of gravid traps at each port of entry | A total of 59 gravid traps are maintained on the four major islands. In addition, 122 New Jersey mosquito light traps monitor the <i>Culex</i> and <i>Aedes vexans</i> populations statewide. 194,903 mosquitoes were sorted. 4,636 pools were submitted to SLD. |
| Sort and pool mosquitoes for WNV testing | Number of mosquitoes sorted, number of mosquito pools submitted to SLD | |
| Necropsy dead birds for WNV testing | Number of dead bird necropsies with tissues submitted to SLD | 207 birds were necropsied and submitted to SLD. |
| Identify sources of mosquito breeding within 2-mile radius of major ports of entry | Number of new mosquito breeding sites identified during surveys, total number of mosquito breeding sites | Oahu, Hawaii and Maui are conducting surveys within a 2-mile radius of ports of entry at the present time. All new breeding sites are documented, treated and added on to the routine list of treatment sites. Survey was last done in 2004. |
| Remove or eliminate sources of mosquito breeding | Number of mosquito breeding sites removed/eliminated | This data is unavailable. Eliminated sites are not archived as to date of removal. |
| Treat (larvicide) mosquito breeding sources | Number of mosquito breeding sites treated | 1,058 mosquito breeding sites were treated 1,247 times. |
| Maintain database of mosquito trap data, and mosquito breeding sources (location, inspection, treatment) | Ongoing maintenance of database | Statewide maintenance of the Vector Control Management System (VCMS) database is ongoing. |
| Report mosquito trap results in a timely manner | Mosquito trap results are reported to appropriate personnel monthly. | See attached graph for mosquito trap results. |

Culex mosquito collection from gravid traps and NJ light traps
from September 2006 to August 2008 on Oahu

Gravid Trap Data



NJ Light Trap Data



State Laboratories Division

Goal: Enhance laboratory capacity to identify WNV in humans and other species (dead birds, equine, live birds' mosquitoes).

Measures of Effectiveness:

| Objective | Measure | Data |
|---|--|---|
| Maintain real-time RT-PCR testing for avian samples and mosquitoes | Number of dead birds, mosquito pools tested statewide | Dead bird tested from Jan. to Aug. 2008 – 165; Mosquito pools tested – 3,179 |
| Maintain Blocking ELISA test in support of live bird surveillance | Number of Blocking ELISA test performed | 2,648 |
| Maintain Plaque Reduction Neutralization Test (PRNT) for the confirmation of West Nile Virus detection by ELISA or MIA | Number of Proficiency testing performed and passed. Number of PRNT testing performed to rule-out West Nile Virus (WNV). | 5 PT samples per year; 5/5 passed. 1 PRNT testing performed (July 2008) |
| Validate the MicroImmunoAssay (MIA) test in support of live bird surveillance activities | Validation/verification studies for the MIA performed within the budget period | TBD – this is for the 2009 budget period |
| Establish MIA as part of the live bird surveillance testing algorithm | Number of MIA tests performed on live birds sera | TBD – this is for the 2009 budget period |
| Maintain database of all laboratory results (surveillance, diagnostic tests) | Submit monthly lab data and post this on the DOH website. | Met |

Prevention Measures of Effectiveness

Number of new invasive species detected at ports of entry.

See Invasive Species Overview below.

Current measures in place to prevent invasive species arrival and establishment

HDOA implements a plant and animal quarantine facility and runs a whole team of biosecurity inspectors; this is in addition to standard federal measures at the border for international goods. As regulations and logistics permit efforts are coordinated between, Homeland Security, USDA,

DLNR and HDOA. For incipient invaders, invasive species committees and DOA work together to prevent establishment. In this report see the following sections: Coqui Frogs, Invasive Species Committee reports, Aquatic Invasive Species Team's implementation of the Aquatic Invasive Species Plan, WNV program with DOH, WRA and Outreach.

Names and numbers of priority pests threatening Hawaii.

See Invasive Species Overview below.

Current status of priority pests for which there is an established prevention program.

Red Imported Fire Ant Plan

Between FY08 and FY09 a total of \$80,000 was approved for the ant coordinator position to implement The Hawaii Ant Plan <http://www.hawaiiantgroup.org/hawaiiantplan/> and to work with invasive ants generally (supervised by HDOA staff). See HISC Budgetary Matters section. A position was advertised and hired in 2008 that will coordinate prevention, early detection, research and other technical issues as appropriate to address this important issue. This plan is cross cutting and applies to management of little fire ant an invasive species already present in Hawaii (Established Pests) and the prevention and rapid response plans related to the as yet absent red imported fire ant.

Avian Bird Disease Coordinator

WNV and emergent disease inter-agency response coordination was implemented using HISC funds from FY08 (\$75,000) to avoid the impacts of WNV through detection and prompt eradication of outbreaks. This is needed to improve inter-agency coordination and response preparedness and will work with the existing WNV Inter-Agency Working Group. This person also works cooperatively with the United State Fish and Wildlife Service (USFWS) to detect avian influenza.

See other sections of this report about coqui frogs below and DOH WNV surveillance, prevention and response, and DAR ballast water and hull fouling project reported above. In addition specific programs are in place for brown treesnake and avian influenza, which are not reported in detail here. A research program seeks to determine the risks posed by other strains of ohia rust (*Puccinia psidii*) that may be present in other parts of the World. So far, the strain found in Hawaii has not been shown to be very virulent on native ohia forests, but it impacts rose apple forests and other rare native forest trees (see below for more information).

Response and Control (Established Pests)

The lead agency for the Established Pests Working Group (EPWG) is DLNR.

Goals: (1) Review priorities for the control of pests already present or recently arrived in the State; (2) Implement cost effective eradication and control programs against incipient and

established pests with shared resources and shared responsibilities of all agencies. More detailed list of goals is given in the HISC Strategy 2008-2013.

Aquatic Invasive Species Response Team (AIST): Highlights

- Over 1,600 worker hours (or 2 ½ months for a crew of 4) were used on the mechanical invasive algae suction device (“Supersucker”) in Kaneohe Bay, removing smothering invasive algae off coral.
- “Herbivory Enhancement Areas” on Maui will be put into place by late 2008/early 2009 to help protect native marine species that are important grazers of macroalgae, which has overgrown and is smothering some of Maui coral reefs.
- Partnership with UH-Manoa researchers working to restore native sea grass beds in Maunalua Bay and Waikiki.
- Over 650 recreational vessel hulls inspected to help prevent inter-island movement of potential AIS.

HISC support to AIST funds a supervisor, six technicians and two interns based on Oahu and the Big Island. HISC funding provided \$395,000 to AIST and those funds were leveraged to raise an additional \$504,100. In September 2008, the HISC approved \$411,400 to support the AIST’s work in FY08-09. These funds are being used for a wide variety of AIS projects that are outlined in the State of Hawaii Aquatic Invasive Species Management Plan.

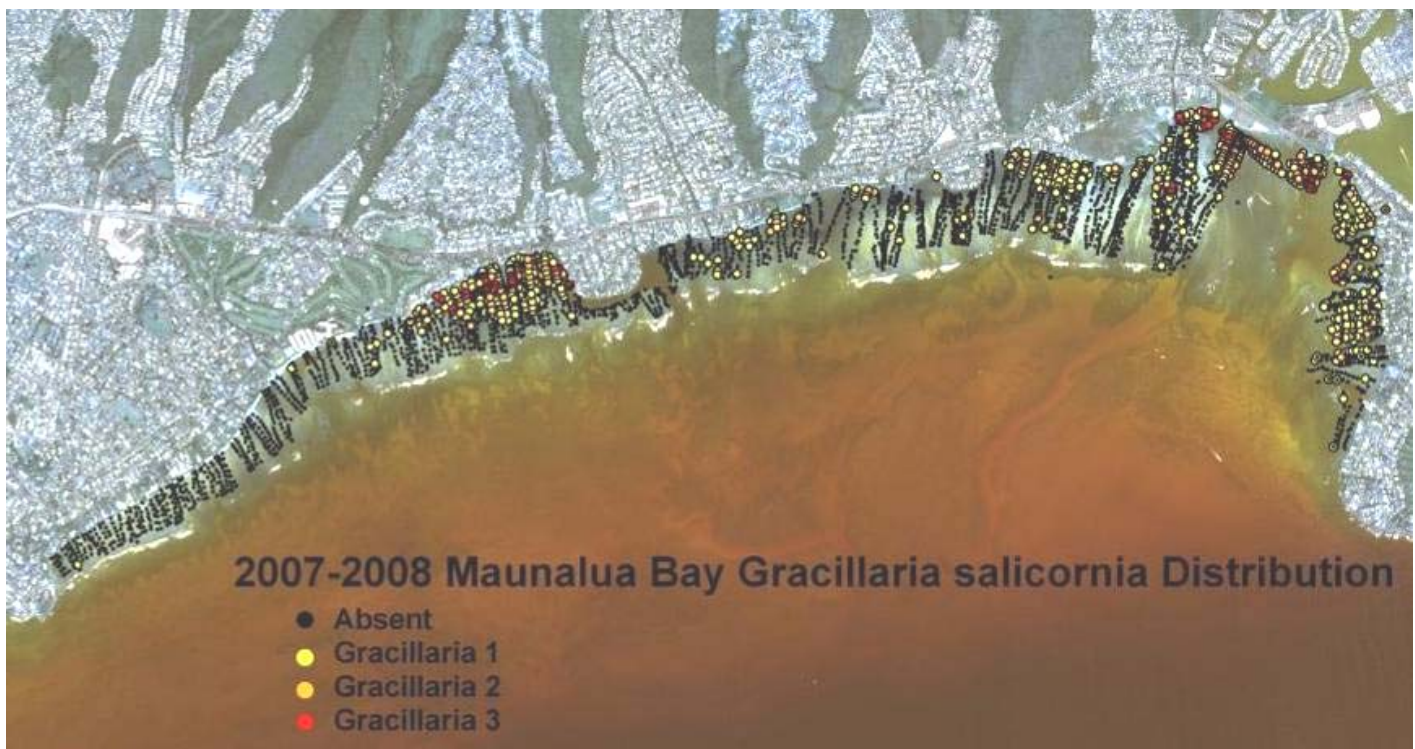
Implementation of the priority response and control actions of the Aquatic Invasive Species Plan

- Integrate knowledge from efforts throughout Hawaii, nationally and internationally, when dealing with specific species, and develop appropriate species-specific plans in relation to both long-term containment and eradication when feasible

In November 2007, a researcher was hired to compile a literature review of chemical, mechanical and biological methods used locally, nationally and internationally and then identify the most promising methods for control of priority AIS in Hawaii. The draft of this document has been completed. The researcher will also work with other organizations including state, federal and nongovernmental organizations (NGOs) to build the necessary working relationships to obtain any necessary permits, necessary training etc. to utilize methods that have the most potential for specific Hawaii AIS.

- Continue to develop and implement a comprehensive approach to remove and control the spread of non-native algae by utilizing mechanical removal, native grazers and the reintroduction of native species.
- In 2008, over 1,600 worker hours (or 2 ½ months for a crew of 4) were used on mechanical invasive algae suction device (“Supersucker”) in Kaneohe Bay, removing smothering invasive algae off coral. AIST also has a project in partnership with UH-

Manoa studying the effect of invasive algae removal with the Supersucker in enhancing the growth of native sea grass beds in Waikiki. These beds are important feeding grounds for endangered green sea turtles. In addition, the AIST continued with extensive surveys to document the current distribution of invasive algae around Oahu. This is critical information when trying to determine the most comprehensive strategy for controlling the algae. These surveys covered approximately 4.5 km² in Maunalua Bay, and 7 km² in Kaneohe Bay. Pearl Harbor was also resurveyed, in conjunction with the Bishop Museum, to compare algae distribution from 10 years ago. Control work continues on the following species: Control work done on *Gracilaria salicornia*, *Kappaphycus/Eucheuma* sp., *Avrainvillea amadelpha*, *Hypnea musciformis*, and *Acanthophora spicifera*.



Map shows distribution and abundance of invasive alga Gracilaria salicornia in Maunalua Bay (red and orange show heaviest infestations).

- Further investigate the use of native grazers, such as urchins, to assist in the control or elimination of invasive algae.

Position will be hired with HISC funds in late 2008/early 2009 to culture urchins and work with the Supersucker for field trials to study if the combination of mechanical removal and increased native herbivory can control the biomass of invasive algae on some patch reefs in Kaneohe Bay.

- Explore the need and feasibility of protection for species that are being used as controls for invasive species.

Herbivory enhancement area on Maui – A DAR study entitled “Fish Habitat Utilization Study” conducted fish and habitat studies at all of Hawaii’s Marine Life Conservation Districts as well as nearby reefs which were open to fishing. The study found a strong correlation between the biomass of fish and the amount of macroalgae. Specifically, reefs which had large numbers of herbivorous fish had very little or no macroalgae, and reefs that were closed to fishing tended to have larger stocks of herbivorous fish. So an “Herbivory Enhancement Area” on Maui has been proposed and is expected to go into effect by late 2008 or early 2009. This area will begin at Kekaa fronting the Sheraton Hotel and extend around Honokowai Point to the southern Edge of Honokowai Beach Park. Data gathered from this project will be used to evaluate the potential of protecting herbivorous species in other areas that have been severely impacted by invasive algae.

- Identify possible vectors and pathways of AIS introductions into and throughout Hawaii and assess the risks and impacts.

Under the direction of the DAR Hull Fouling and Ballast Water Coordinator, AIST is performing inspections of hulls of recreational vessels. In 2008, AIST conducted approximately 650 inspections and as well as 50 face-to-face surveys of boat owners to assess hull husbandry practices, and the typical number of trips that the owners make either intra- or inter-island. This data will be used to construct a risk assessment to determine the threat posed by hull-fouling organisms being transported to different locations on recreational vessels.



An Aquatic Invasive Species Team technician determines the level of fouling on a recreational sail boat.

- Number and names of species, habitats, ecosystems, agricultural, and managed areas protected because of control efforts.

These control efforts by the AIST are protecting coral habitat (one of the most productive and biologically diverse habitats in the world) in Kaneohe Bay, Maunalua Bay, and on Maui as well as statewide by working to restrict the movement of potential AIS. In

addition, vital grass beds, which serve as nursery grounds for many juvenile fish and invertebrates, as well as feeding grounds for sea turtles, are being protected.

Oahu Invasive Species Committee (OISC): Highlights

HISC support to OISC funds the core of an island-wide effort to fulfill the Response and Control and Outreach sections of the HISC Strategic Plan (OISC outreach accomplishments can be found in the outreach section of this report). Volunteers concerned about the spread of fountain grass on Oahu founded OISC in the mid-1990s. Now, OISC systematically controls 18 plant and animal species, educates the public about invasive species, and is implementing an early detection strategy to find and control invasive species before they can jump the fence line. In FY08 HISC funds to OISC equaled \$434,000. OISC leveraged these funds to raise an additional \$190,097. HISC approved an allocation of \$413,200 for FY09 for OISC.

OISC surveyed 13,034 acres for 18 key target species, and 16 incidental species. In the process OISC surveyed controlled a total of 1,951 acres, 23,164 individual plants were treated, and a total of 7,336 worker hours were used.

Number of species detected and evaluated for feasibility of eradication:

Prioritization processes identified and in place:

OISC and the Bishop Museum have partnered together to implement the Oahu Early Detection (OED) program. Through island-wide botanical surveys, OED has developed a list of 150 species that are currently being assessed for feasibility of eradication. These surveys have turned up 35 new island records—species that are known to be in the state, but never documented as being on Oahu.

In addition to the early detection program, OISC has evaluated all of the 18 species it works on for the feasibility of eradication. This list was begun from a wider list of at least 68 species identified as invasive, prioritized for threat and evaluated for feasibility of eradication at one of the founding meetings of OISC in 2002.



Crews attempt to control the Himalayan blackberry, a thorny vine capable of smothering native plants and altering habitat.

Number and area of priority invasive species eradicated and/or controlled:

Number and names of species, habitats, ecosystems, agricultural, and managed areas protected because of control efforts:

Between November 1, 2007 and October 31, 2008, OISC surveyed for and controlled 34 different plant, vertebrate and invertebrate species, including miconia and coqui frog, over 13,034 acres. Highlights are below:

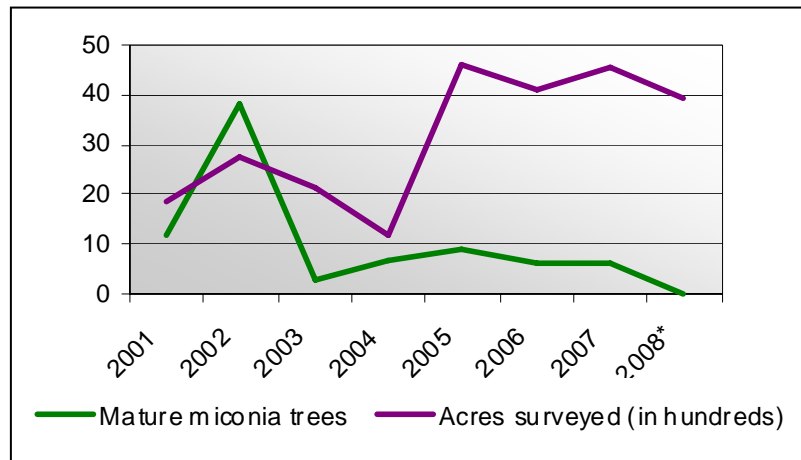
- The numbers of both seedling and mature miconia have steadily decreased while the effort to find it has remained the same, indicating that the spread of miconia has been stopped. As

a result of these systematic surveys and control work, native forest ecosystems and watersheds of the Koolau Range are being protected.

- All known populations of smoke bush (*Buddleja madagascariensis*) have been completely removed from the island, protecting mesic forest ecosystems of the Koolau and Waianae Range.
- Forests and summit regions of Palolo and Maunawili Valleys are protected from Himalayan blackberry (*Rubus discolor*). This species of blackberry is only found in Palolo Valley and was creeping toward the native forests of the Koolau summit. OISC has been systematically controlling it, removing 3,151 plants over 128 acres during the reporting period.
- OISC has protected homes and natural areas along the Waianae coast from the increased risk of fire that an invasion of fountain grass would bring. OISC monitors and controls all populations west of Punchbowl and north of Lanikai.

Implementation of the priority response and control actions of the aquatic invasive species, WNV, coqui frog, and red imported fire ant plans

In accordance with Section 194-2 (a) (4), HRS, OISC aims to reduce and control coqui frog infestations on public lands that are near or adjacent to communities by working with the HDOA to keep all coqui frogs off Oahu. Control efforts implemented between 2004 and 2006, removed the Island's only naturalized population of coqui frogs. No frog has been heard there since November of 2006. However, coqui frogs are continually re-introduced to Oahu via plants imported from coqui-infested areas on the Big Island.



Mature seed-bearing miconia trees compared to acres surveyed: The steady decline of mature trees while the acres surveyed has expanded or remained constant means that OISC has successfully interrupted the reproductive cycle of the tree and stopped its spread.

OISC did the following during 2008 to keep public lands and residential areas on Oahu free of coqui frogs:

- In conjunction with HDOA, monitored nurseries that import plants from coqui-infested areas on other islands.
- Hand captured four frogs at the nurseries, before they were spread via plants.
- Cooperated with HDOA to conduct spray operations at a nursery with a more serious infestation.
- Spoke to night shift workers at retail garden stores to encourage them to report coqui frogs if heard.
- Responded to reports of coqui frogs from the general public. OISC personnel verified individual coqui frogs and removed them from Waialua, Mililani and Aiea.

Other accomplishments:

- OISC received a “2008 Special Achievement in GIS” award from ESRI, the leading geographic information system software company. OISC was among 170 awardees chosen from more than 100,000 ESRI user sites worldwide “in recognition of their outstanding work in the GIS field.”

Maui Invasive Species Committee (MISC): Highlights

Significant progress on all target species protected important conservation and agricultural lands.

Highlights included:

- Approximately 45,910 acres surveyed for 11 invasive plant species.
- Total number of plants controlled = 63,458 (2,104 mature).
- Number of dead birds submitted for WNV in 6-month period: 26.
- Public contact through outreach & education efforts: 3,250.
- Partnership support resulted in greater than a 2:1 match for all state funding.

MISC conducted survey and control efforts for targeted invasive species on both Maui and Lanai. On Maui, these activities helped to protect eight unique ecosystems, which support 79 federally listed threatened and endangered plant species and a comparable number of candidate species and species of concern. Work concentrated on controlling the highly aggressive forest invader, *Miconia calvescens*, and the ecosystem-modifying pampas grass (*Cortaderia* spp.) to protect the integrity of the east and west Maui watersheds. Important grazing areas were protected from the fire-adapted fountain grass and control efforts against banana bunchy top virus helped limit continued spread to commercial and domestic banana production.



The raucous coqui frog (*Eleutherodactylus coqui*) continued to be Maui’s top animal pest. Efforts shifted to the infestation in Maliko Gulch, consistent with the Legislature’s recent mandate to control coqui on public land adjacent to communities. The eastern half of the heavily infested gulch is state land which borders the Haiku community. Other population centers on Maui have been eradicated or fully contained.

Lanai has 37 endangered or threatened plant species. After years of grazing by introduced ungulates, Lanai has a greatly diminished forest area, underscoring the importance of protecting the watershed from additional invaders. Work on Lanai focused on two species: fountain grass and ivy gourd. Successful control efforts against fountain grass (*Pennisetum setaceum*) are protecting the open hunting areas of Kanepuu from this fire-prone invader. An infestation of ivy gourd (*Coccinia grandis*) has been greatly reduced in the Manele area through persistent control action. Lanai remains free from the devastating banana bunchy top virus. Periodic surveys of all banana production on Lanai helped protect the agricultural industry from BBTv and provided an opportunity for growers to provide clean tissue for production elsewhere in the State.

Progress on control efforts in Maui County are reviewed by subject matter experts during regular Committee meetings. Quarterly reports detail project activities and are available on the MISC website. All tabular and spatial data are ported annually to the statewide ISC database, which is managed by the U.S. Geological Survey's Pacific Basin Information Node. Selection of target species is evaluated during an annual priority-setting workshop, based on a New Zealand model.

Miconia:

- Ground and aerial crews surveyed 23,766 acres for miconia.
- Over 57,700 miconia plants were controlled, including 566 mature ones.
- Aerial control efforts benefited from substantial support and involvement by the National Park Service.
- A partner project with Hana Ranch and Natural Resources Conservation Service (NRCS) funding supported one additional staff and aerial operations.

Coqui Frog:

- Five population centers on Maui have been eradicated, meaning it has been more than one year since the last vocalization was heard.
- Eight population centers have been contained.
- Work continued in Maliko Gulch. Crews delimited the extent of the lower infestation of the gulch, which represents spread within the gulch. Where feasible, initial control work occurred in these lower infestations.
- All background work for the coqui-free certification program has been completed, including surveys and production of marketing materials. The program will be launched officially in October 2008. Approximately 23 nurseries and plant providers are official participants in the program.
- More funding is needed to aggressively manage the Maliko wildland infestation.



Molokai/Maui Invasive Species Committee (MoMISC): Highlights

Molokai is richly endowed with rare native plants, including 60 federally listed plant taxa, 52 candidate and species-of-concern plant taxa, as well as rare invertebrates and birds. There is broad agreement on Molokai that watershed protection, the home for many of these rare species, is the Island's top environmental priority, and that agriculture is the heart of the Island. Control efforts on Molokai focused on protecting both the watershed and agricultural interests.

Much effort is focused on preventing the worst invaders that have gained a foothold elsewhere in the islands from becoming established on Molokai. Annual aerial surveys of the forested watershed are needed to ensure early detection of plants, such as miconia. Community outreach and education has been a high priority to help prevent the



introduction of new threats. MoMISC has successfully partnered with other state and federal agencies to eradicate several harmful species and to survey for agricultural pests.

Progress on target species included:

- Over 11,780 acres surveyed for invasive plants and animals.
- Total number of plants controlled = 2,961 (805 mature).
- Evaluation of albizia (*Falcataria moluccana*) as a new target species.
- Extensive survey and control for banana bunchy top virus.

Banana Bunchy Top Virus

- MoMISC partnered with federal and state agricultural staff and MISC to conduct surveys on Molokai for BBTV.
- Approximately 2,204 acres were surveyed and 462 infected plants were treated.
- Staff conducted educational outreach during door-to-door surveys about the disease.

Other Accomplishments

- Delimiting surveys were conducted to determine the extent of an albizia infestation and assess feasibility of control. Over 83 acres were surveyed with initial control of 4 trees. MoMISC agreed to take this on as a new target.
- Approximately 8,705 acres were surveyed for miconia and other forest invaders.
- MoMISC officially declared pampas grass eradicated from Molokai.

Public Outreach

- MoMISC maintained informational displays at the airport kiosk, public wharf, and community boards.
- Outreach articles were published in the local newspaper.
- Staff participated in the annual Earth Day event on Molokai.
- Quarterly articles on invasive species were published in The Nature Conservancy's newsletter.



Kauai Invasive Species Committee (KISC): Highlights

KISC continued working on prevention, detection, and control of targeted species and received \$270,000 in HISC funding in FY08. KISC surveyed over 5,728 acres for 12 key target species. In the process KISC controlled a total of 681 acres, 10,463 individual plants were treated, and a total of 7,032 worker hours were used. Also, approximately 473 miles of roadside was surveyed for 64 early detection species. The HISC approved budget allocated \$397,300 in HISC funding to KISC in FY09.

The two top priority species for Kauai are the forest invader, *Miconia calvenscens*, and the noisy

coqui frog, *Eleutherodactylus coqui*, which is limited to one known population on the island. These species, as well as KISC's other targeted species, are evaluated and updated each year at an annual strategic planning meeting.

Miconia:

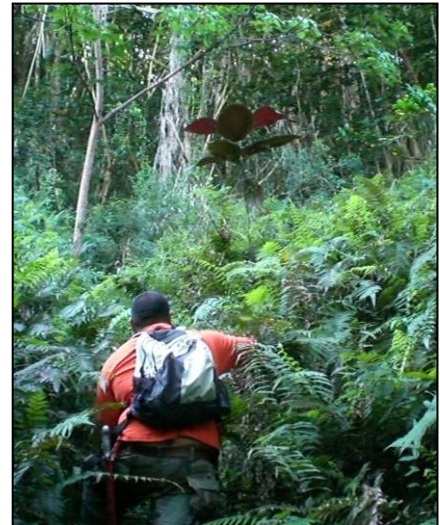
- Over 935 acres of wildland acres have been surveyed either on the ground or by air; both in known infested areas, as well as suitable habitat.
- No mature trees have been found since 2004.
- 714 seedling and vegetative plants were destroyed.
- Survey partners have included DLNR's Division of Forestry and Wildlife (DOFAW) and HDOA.



Before and after a coqui infestation site is cleared of vegetation.

Coqui Frog:

- Continued vegetation clearing at the coqui infestation site to modify coqui habitat.
- Field staff have worked on the one 20 acre infestation area on Kauai as well as responded to reports of calling frogs island-wide.
- Over 3,416 work hours have been expended do date this year alone on this target species.
- The infestation area has been reduced to only a few calling frogs.
- KISC utilized both hydrated lime and citric acid for chemical control work.
- KISC coordinated the work plan outlined by the Kauai Coqui Frog Working Group, a partnership of private and government agencies.



KISC crewmember hikes to miconia plant.

Early Detection:

- 473 miles of roadway were surveyed island-wide for incipient species on Kauai.
- 64 species were targeted for survey with 8 species making the final list for possible eradication.
- KISC is the primary responder on Kauai to collect dead birds for testing for WNV and avian influenza.
- Island-wide surveys continue at nurseries and greenwaste stations for the coqui frog, little fire



Trailhead sign installed at Kuilau Ridge Trail.

ant, and nettle caterpillar in cooperation with HDOA.

- Increased community awareness through education and outreach as to the importance of reporting early detection species.

Capacity Building:

- Assisted HDOA with nursery surveys and targeted species eradication.
- Worked in the Halelea Forest Reserve with DOFAW conducting miconia survey and eradication work.
- Conducted miconia survey and eradication work in Wailua River State Park.
- Partnered and assisted the National Tropical Botanical Garden and Kokee Resource Conservation Program on weed eradication projects.
- Worked with the Department of Defense at Pacific Range Facility in Mana to eradicate long thorn kiawe.
- Assisted DOH and USFWS with dead-bird pickups island-wide.
- Provided safety training for all interested partner agencies and groups.

Big Island Invasive Species Committee (BIISC) Highlights

BIISC surveyed 6,244 acres for 5 key target species, and two incidental species and controlled a total of 16,608 acres, 17,610 individual plants were treated, and a total of 4,357 worker hours were used. An additional 165 miles of road were surveyed by the early detection crew looking for and mapping 138 potentially incipient invasive species.

Miconia calvenscens

- BIISC continues to focus containment strategy along a 40-mile containment buffer between Malama Ki in lower Puna to Ninole in the Hamakua districts. Surveys focused in the Hilo, Hamakua and Puna districts.
- Completed aerial surveys in the upper Hamakua district at elevations between 1,400' and 1,600'. A total of 1,598 acres were surveyed by air, while ground crews removed a total of 687 plants in this area.
- Expanded survey and control effort from 1,600' to the 1,800' elevation above the core population in Onomea after finding a small number of plants at the 1,700' elevation.
- Began work in a 52-acre control block in the Nanawale Forest Reserve. This project was terminated after data analysis revealed the feasibility to complete the mission was questionable after finding a large number of plants within the control area, as well as adjacent private parcels.



- Completed survey and control blocks in the Makuu Forest Reserve. DOFAW donated 12 hours of air time to this effort which allowed BIISC to drop the ground crew at the far southern end of the survey sites to limit walk time to the survey and control blocks. DHHL assisted BIISC in permitting us to utilize their lands as a landing zone to load and off load the crew.
- Aerial spot treatments for miconia took place in Wao Kele O Puna Forest Reserve (WKOP) and Malama Ki.

Plume Poppy (*Macleaya cordata* formally *Bocconia frutescens*)

Survey and control activities focused in the Wood Valley area of Kau, and Honomalino area in S. Kona.

Crews controlled a total of 2,760 plume poppy plants covering a total of 695 acres within the Wood Valley control area.

BIISC conducted one aerial spot treatment within the Kau Forest Reserve treating 5 large adult trees. The one hour air time for this spot treatment was donated by DOFAW.

Crews conducted plume poppy control in the Honomalino area of S. Kona. Initial efforts focused on total eradication of this population and estimated to take 3 months. However after crews found a substantial amount of plants within the control area, it was determined that eradication was not feasible. The priority has shifted to a containment strategy. Further work is needed to determine the size of this population with assistance from the community. To complicate efforts, conventional control methods using herbicides is hampered by the number of organic farms in the area. UH-College of Tropical Agriculture and Human Resources (CTAHR) is assisting in alternative control methods for the organic farmers.

Fountain Grass (*Pennisetum setaceum*)

BIISC continues to expand its fountain grass control activities in the Kau/S. Kona districts. This project is a joint effort by staff from the DOFAW and the Research Corporation of UH (RCUH) personnel of the Resource Management Division of Hawaii Volcanoes National Park (RM/HAVO).

BIISC crews have controlled a total of .01 acres treating a total of 115 plants. The total observed acres for roadside surveys are 695 acres total. The number of plants treated, is significantly less than last report since the majority of plants previously treated has been reduced substantially.

BIISC controlled fountain grass along roadsides along the Hamakua coast. Crews treated a total of 1,278 plants along the Hamakua highway. The intent of this effort was to expand the highway buffer



from the core in West Hawaii to East Hawaii.

Pampas Grass (*Cortaderia jubata*)

BIISC completed removing all pampas grass at the Waimea Country Club and adjoining private parcels, the largest known population on the Big Island.

BIISC completed roadside surveys in the Volcano area after receiving reports of pampas grass being grown in private yards. Two known locations were found to be free of pampas grass and BIISC believes the plants were removed by the property owners. The crew was not able to verify this as the owners were not home at the time of the surveys. BIISC will continue to monitor these locations in the future.

Wax Myrtle (*Morella cerifera*)

BIISC began an aggressive control effort of wax myrtle, a close relative to the faya tree which has invaded forests in Hawaii's Volcano National Park and surrounding areas. Crews have removed a total of 867 plants, all of which were considered mature, expensing a total of 184 work hours. This population is quite large and will require extensive effort to control the population, however, at the moment this is the only known population in Hilo. BIISC strategy for this site is full eradication.

Other plant species

Pyracantha (*Pyracantha angustifolia*)

BIISC followed up on a report of pyracantha in the Panaewa community in Hilo, BIISC crews went to survey the site. However, crews were unable to locate the plant. BIISC crews did not find any other plants during the roadside survey.

Mexican Sunflower (*Tithonia diversifolia*)

Surveyed and controlled a total of 57 acres at two locations in E. Hawaii.

Early Detection

- BIISC completed roadside surveys of the Kau and S. Kona districts.
- Met with partners to assess and update the early detection species list. The species list has increased to a total of 138 species up from 52 species a year ago.
- The early detection team continues to work with the WRA team to assess a small number of unranked species on the current species list.

Coqui

BIISC assist the State Coqui Coordinator by providing office space, equipment (including computers) and administrative assistance to its project and personnel. In addition BIISC assists

with all hotline calls and provides citric acid to community members through its citric acid matching program (CAMP). BIISC efforts also include:

- Providing two (2) cell phones to communities in the Volcano and upper Puna areas to respond to hotline calls directly. The community hotline calls total 96 to which community teams responded and treated 75 areas.
- Received a total of 1,275 hotline calls between BIISC and USFWS, all of which were implemented into the coqui database (see map).
- Provided a total of 448 50-lb. bags of citric acid to community members as part of the citric acid matching program (CAMP).
- BIISC provided technical assistance to 9 community groups wanting training on application and spraying techniques. These were in addition to training programs given by Hawaii County.
- BIISC assisted the Volcano community with putting in coqui street signs the group purchased with a grant from the Hawaii Island Economic Development Board.
- BIISC crews assisted DOFAW/Natural Area Reserves System(NARS) with aerial control activities at the Manuka Natural Area Reserve in Kau.

The State Coqui Coordinator is responsible for:

- Maintaining the interagency databases and develops maps for the coqui hotline calls, road surveys and control efforts.
- Maps and reports are used to track progress and strategize State efforts.
- The control operations are contracted to the USFWS.
- Targets high-value natural areas and state land near residential areas.
- Eradicated 5 incipient populations.
- Controlled an area of 62 acres.

Coqui Community Outreach

- Coordinated the establishment of a coqui barrier fence around the Kulani Prison parking lot to prevent the spread of frogs into the prison area.
- Conducted nursery support in Waimea.
- Supplied community support for organizations in Honokaa and Volcanoes area.
- Sprayed buffer zones around state park parking lots to prevent spreading the frogs on vehicles

Response and Control (Established Pests) Measures of Effectiveness

The HISC Strategy 2008-2013 mentions the following measures of effectiveness for the Established Pests Working Group.

Number of species detected and evaluated for feasibility of eradication.

All of the invasive species committee target species see list below, have been evaluated for the feasibility of eradication.

Invasive Species Committees Target List.

The invasive species committees (ISC) have a total of 34 active target species. Classification as a Target Species is dependent on many organizational and environmental factors that are unique to each ISC and this classification can and will change over time. Therefore, this Target Species list only represents a snapshot in time. This Target Species list does not constitute a complete list of species that a particular ISC works on, only a subset of species. There are other species classifications, such as Early Detection (approximately 200 species), eradicable and opportunistic, that define work on a wide range of other species. Many projects and species targets are controlled in cooperation with collaborators in the community or with HISC member agency staff.

| Latin Name | Common name | Invasive species for which species is a target |
|----------------------------------|----------------------------|---|
| <i>Aratinga mitrata</i> | mitred conure | MISC |
| <i>Arundo donax</i> | giant reed | KISC, MISC, MoMISC |
| <i>BBTV</i> | banana bunchy top virus | MISC, MoMISC |
| <i>Chamaeleo calyptratus</i> | veiled chameleon | MISC |
| <i>Coccinia grandis</i> | ivy gourd | KISC, MISC |
| <i>Cortaderia jubata</i> | pampas grass | MISC |
| <i>Cortaderia selloana</i> | pampas grass | BIISC, KISC, MISC, MoMISC, OISC |
| <i>Cryptostegia grandiflora</i> | rubber vine | BIISC, MISC, MoMISC |
| <i>Cyathea cooperi</i> | Australian tree fern | MoMISC |
| <i>Eleutherodactylus coqui</i> | coqui frog | BIISC, KISC, MISC, MoMISC, OISC |
| <i>Falcateria moluccana</i> | albizia | MoMISC |
| <i>Macleaya cordata</i> | plume poppy | BIISC |
| <i>Maclura pomifera</i> | osage orange | MISC |
| <i>Miconia calvenscens</i> | velvet tree | BIISC, KISC, MISC, MoMISC, OISC |
| <i>Morella cerifera</i> | wax myrtle | BIISC |
| <i>Morella faya</i> | fire tree | OISC |
| <i>Pennisetum setaceum</i> | fountain grass | BIISC, KISC, MISC, MoMISC, OISC |
| <i>Pereskia aculeata</i> | Barbados gooseberry | MoMISC |
| <i>Phormium tenax</i> | New Zealand flax | MoMISC |
| <i>Piper auritum</i> | false awa | KISC, OISC |
| <i>Pittosporum undulatum</i> | Victorian box | MISC |
| <i>Pittosporum viridiflorum</i> | cape pittosporum | MISC |
| <i>Prosopis juliflora</i> | long thorn kiawe | KISC, MoMISC |
| <i>Rhodomyrtus tomentosa</i> | downy rose myrtle | MISC |
| <i>Rubus ellipticus</i> | yellow Himalayan raspberry | MISC |
| <i>Rubus discolor</i> | Himalayan blackberry | OISC |
| <i>Salsola kali</i> | tumbleweed | MoMISC |
| <i>Schizachyrium condensatum</i> | bushy beard grass | OISC |
| <i>Senecio madagascariensis</i> | fireweed | KISC, OISC |
| <i>Tibouchina urvilleana</i> | lasiandra, princess flower | OISC |
| <i>Typha latifolia</i> | common cattail | KISC |
| <i>Ulex europaeus</i> | gorse | MoMISC |
| <i>Verbascum thapsus</i> | common mullein | MISC |
| <i>Wasmannia auropunctata</i> | little fire ant | BIISC, KISC |

Number and area of priority invasive species eradicated and/or controlled.

See text above for each invasive species mentioned for each county.

Prioritization processes identified and in place.

Experts and managers are consulted in the setting of invasive species committee target priorities. The weed risk assessment system see below is used to determine if alien plants are likely to become invasive plants/weeds.

Implementation of the priority response and control actions of the aquatic invasive species, West Nile virus, coqui frog, and red imported fire ant plans.

See report about coqui frog work under heading Coqui Frogs in this report and notes from each of the working groups.

Red Imported Fire Ant Plan

Between FY08 and FY09 a total of \$80,000 was approved for the ant coordinator position to implement The Hawaii Ant Plan <http://www.hawaiiantgroup.org/hawaiiantplan/> and to work with invasive ants generally (supervised by HDOA staff). See HISC Budgetary Matters section. A position was advertised and hired in 2008 that will coordinate prevention, early detection, research and other technical issues as appropriate to address this important issue. This plan is cross cutting and applies to management of the little fire ant, an invasive species already present in Hawaii, and the prevention and rapid response plans related to the as yet absent red imported fire ant.

Number and names of species, habitats, ecosystems, agricultural, and managed areas protected because of control efforts.

Invasive species control, and related work on prevention, research and outreach programs reported here influence or potentially influence the whole state. They serve to protect people's livelihoods, cultural, aesthetic and natural resources that are held dear in Hawaii, and basic human health. Benefits may be direct or indirect as the State seeks to protect watersheds, endangered native species, crops, animal and plant health, marine ecosystems. Numbers and names are too numerous to count, though specific benefits are generally evident where each project is described.

Research and Technology

Research and Technology Goals: 1) Encourage researchers to address the problems created by invasive species. 2) Encourage the development and implementation of new technology to prevent or control the establishment of invasive species. 3) Develop effective, science-based management approaches to control invasive species. 4) Effectively communicate and apply the results of research to the field. 5) Promote interagency collaboration and stimulate new partnerships. More detailed goals are outlined in the HISC Strategy 2009-2013.

Research and Technology in 2008-2009

Research and Technology working group recommended that the Council allocate \$500,000 of funding to a new research and technology projects. This differs from previous years in that there was a mix of competitive grants proposed, as well as specific projects supporting local initiatives that support the development of local capacity. Meanwhile the overall amount of funding was reduced from the \$700,000 amount allocated last year:

- a. \$330,000 – Projects addressing invasive species will be solicited via a public notice of request for proposals in the last quarter of the 2008 calendar year, this helps to encourage competition among providers allowing us to obtain the most advantageous proposal(s) that the market can support. Last year, 15 high quality research and technology projects were funded at a cost of \$782,156; these were selected from a pool of 48 proposals received in late 2007 that addressed coqui frog and general invasive species issues with all the funding requests received totaling approximately \$2.8 million. Worthy projects went unfunded in 2007-2008.
- b. \$10,000 – An international workshop seeks to develop collaborative projects with other countries in the South Pacific to do research on biocontrol agents for shared pests, with the desired end point of obtaining biocontrol agents for priority pests at reduced cost. Funds will allow USDA and HDOA staff to participate.
- c. \$160,000 – Bishop Museum's Hawaiian Biological Survey program will provide up-to-the-minute information about the status of alien and invasive plant and animal species present in Hawaii, as well as identification services for introduced species. There are already 5,314 alien species documented as established in the wild, many thousands more are known to occur. This supports one of the HISC's legal mandates: "For those species that do arrive in Hawaii, identify and record all introduced and invasive species present in the State." Extra attention will be given to incipient species, and the information is expected to support management efforts and regulatory and policy issues that require agencies to know which species are present in Hawaii.

This is a multi-year project but when completed the database will provide the following benefits:

- Provide single, compiled source of information on all alien species in Hawaii
- Provide summary statistics about invasives and their trends in Hawaii
- Provide real-time updating of information from management and research communities
- Meet HISC strategic plan goal of identifying and compiling information on all invasive species in the state
- Serve entire invasives-management community by providing information useful for:
 - Preventing inter-island movement of known invasives
 - Identifying invasives at high risk of movement within the state

- Identifying which species justify triggering private-property access provisions for control purposes
- Identifying incipient populations liable to rapid eradication
- Sharing among all stakeholders relevant information to assist in management of invasives
- Taxonomic identification
- Informing Legislature and general public of management needs and progress

Research and Technology Grants in 2007-2008

HISC research and technology working group evaluation committee completed a review (late in 2007) of 48 research and technology proposals following request for proposals that attracted 12 coqui frog and 36 general invasive species proposals. A total of 21 reviewers looked at some or all of the proposals, including staff and experts from DOA, DEBDT, DOH, DLNR, HISC, USDA, UH, Bishop Museum, USGS, etc. A core interagency group met at the University on November 29, 2007 to review the top ranked projects.

Fifteen projects were selected (below) for funding. The total amount funded in 2007-2008 came to \$782,156, a little over the \$780,000 agreed for in the HISC budget (HISC Research and Technology funds plus the \$80,000 contingency fund). Some HISC support funds were redirected to cover that shortfall. Principal investigator surname and agency are indicated after proposal titles:

Survey for insect enemies of Bocconia frutescens in Costa Rica – Johnson/USDA-FS

Summary: The Principal Investigator (PI) will work with colleagues in the University of Costa Rica to identify host specific natural enemies of *Bocconia frutescens*. *B. frutescens* is a shade tolerant bird dispersed tree invading East Maui and parts of the Big Island. It is spreading quickly into relatively pristine undisturbed native forest; it is able to colonize fern filled gulches and is increasing in cover and frequency in these habitats. \$16,444

Biocontrol of Rubus ellipticus using insect agents in China – Johnson/USDA FS

Summary: Specific natural enemies of yellow Himalayan raspberry will be the focus of search efforts in China. Originally only found on the Big Island it has spread to Maui through trade in hapuu trunks. It has invaded deeply into pristine forests at Volcanoes since its arrival in the 1960s. It forms dense impenetrable thickets. \$42,955

Green and healthy Hawaii: identifying and introducing alternative ornamental landscape plants in response to invasive species issues – Kaufman/UH

Summary: This project is focused on identifying and evaluating alternative non-invasive ornamental plants to use in place of known invasive species currently in use by industry. The work will involve consultation with landscape industry experts to identify alternatives, determination of their non-invasive status, field testing of plants, and production of outreach material. \$120,516

Ecological, hydrological, ecological and economic impacts of miconia in Hawaii – Lee/Entrix

Environmental Consultants

Summary: To test assumptions about miconia's impact on soils and hydrology. Initiate assessment of long term impacts of miconia through comparison with Tahiti where the problem is more advanced, and damaging. Provide economic estimates of watershed damage from miconia in Hawaii. Host a regional conference on the ecological impacts of miconia. \$96,999

An early detection system for invasive marine species – development and proof-of-concept of a taxonomic microarray Toonen/UH

Summary: The goal is to design and fabricate a taxonomic microarray that can quickly and quantitatively be used to identify the presence of a set of species, from a mixed sample of plankton or boat hull scrapings. Species selected will include known and potential invaders not yet established in Hawaii. \$69,728

Evaluating impact of Puccinia psidii rust strains on ohia – Hauff/DOFAW

Summary: This project aims to document the impacts of a variety of strains of ohia rust on ohia through tests carried out on a variety of ohia types from Hawaii, but carried out in Brazil where it is believed that ohia rust originates. \$36,049

Chemical ecology of the little fire ant for detection delimitation and control in Hawaii

Siderhurst/Eastern Mennonite University

Summary: This project aims to identify and isolate little fire ant pheromones that may be useful as attractants to be used to detect and or control the ant in new sites where it is currently unknown to occur, or where it is having negative impacts on valued resources and human health. \$82,500

Determining the efficacy of fungicide to protect endangered species from the rust Puccinia psidii – Uchida/UH

Summary: Trials to determine types and amount of fungicide needed to control ohia rust on a small scale where it affects rare native species. \$34,810

The effects of cooking on diphacinone residues in feral pig tissue – Pitt/APHIS

Summary: This project aims to address concerns about the use of diphacinone containing baits as a rodenticide to reduce the harmful impacts of rodents on Hawaii's threatened and much depleted native flora fauna. Although strict rules are to be adopted limiting the hunting of pigs in areas treated with diphacinone — and it is known that pigs that eat the baits do not accumulate levels of the chemical that would pose a risk to human health. Via laboratory tests this study will accurately document the risks related to incidental consumption of pigs by humans where the pigs have eaten baits. \$31,050

Invasive ant control for native ecosystem preservation and restoration in Hawaii – Krushelnycky/UH

Summary: Trials will be undertaken on potentially effective insecticides that may be used to control ants in Haleakala National Park on Maui where ants are negatively impact native vertebrate and invertebrate species. \$73,726

Hawaii's invasive plant species: an interactive key for the identification and management of invasive species in Hawaii. James/Bishop Museum

Summary: An online interactive key will be developed for common invasive plant species. In addition management methods will be described for each species. This will allow anyone, expert or member of the public, to correctly identify these species using a simple set of characters presented in an appealing visual way. \$25,122

Barn Owl/Rat: invasive predators of endangered seabirds Penniman/UH

Summary: Barn owl traps will be developed to facilitate control of this species which is contributing to the decline of seabirds nesting on Lanai. In addition their diet will be studied. Rats will be monitored and controlled – these are the other invasive species contributing to seabird decline at the site. \$38,860

Developing a database for the Hawaii Pacific Weed Risk Assessment System. Harrison/UH

Summary: A reorganization and systemization of the data gathered in the process of undertaking weed risk assessments. This is needed to facilitate more consistent data collection, and improve the management of the process. Currently each risk assessment is stored in a separate spreadsheet, more than a thousand species have been assessed and many more assessments are planned. \$16,000

Overcoming site limitations in the control of coqui frog populations – Penniman/UH/MISC

Summary: This study aims to test the use of large agricultural sprinklers as a means to deliver standard control measures (dilute citric acid) to frogs in what is the only (as yet) uncontrolled population of frogs on Maui at Maliko Gulch. The site's difficult terrain and dense vegetation has hindered control efforts to date. Eradication may be feasible if this population can be controlled and future introductions from the Big Island can be prevented. \$75,000

Dermal toxicity of aqueous solutes in coqui frog – Mautz/UH

Summary: This laboratory based study will test the effectiveness of a number of aqueous solutes for the control of coqui frogs and compare them to existing methods using citric acid and hydrated lime. Compounds to be tested for control effectiveness are citric acid, hydrated lime, sodium citrate, sodium chloride, potassium chloride, calcium chloride, sodium bicarbonate, potassium bicarbonate, potassium nitrate, ammonium nitrate, dextrose and dextrin. \$22,397

Highlights of on-going and completed HISC funded research projects

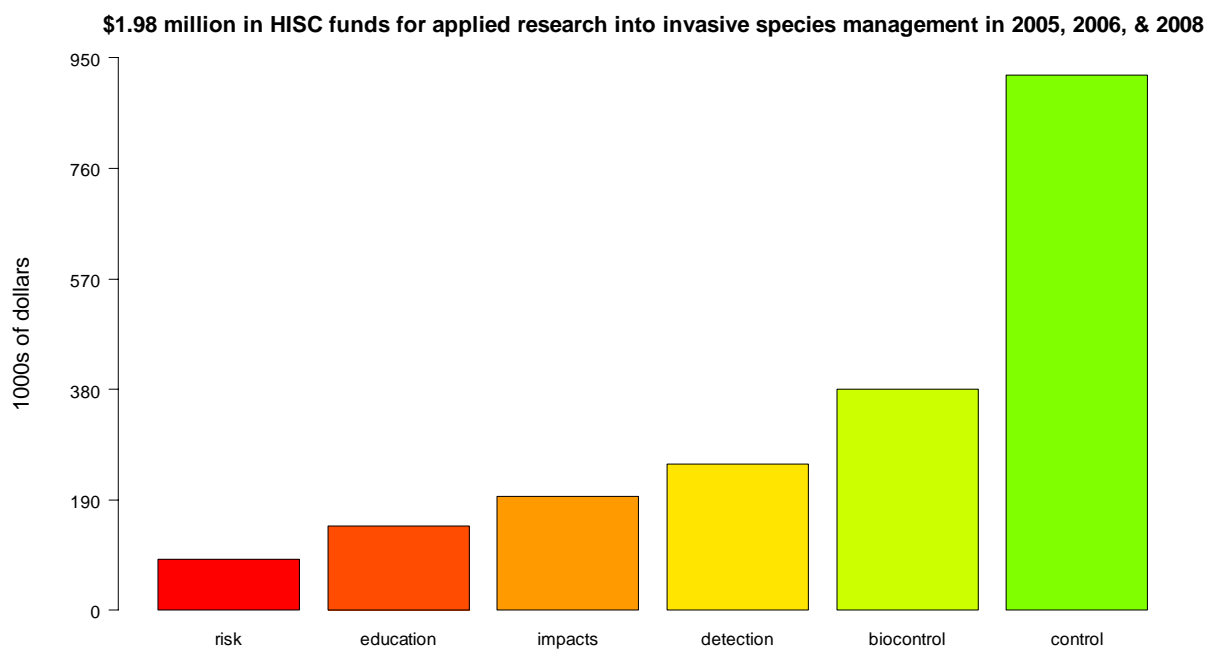
- Growth and survival of colonial nesting seabirds in the Hawaiian Islands — North Mokolua and Mokuauia islets were documented. Nesting success (survival of chicks) improved with the removal of ants demonstrating that even invertebrates can affect the conservation status of seabirds. Through the course of this study ants appear to have been eradicated from Mokuauia.
- Promising biocontrol measures were investigated for major forest weeds miconia, tibouchina and clidemia.
- Investigation of biocontrol measures for the *Erythrina* (wiliwili) gall wasp continues with trips being made by HDOA entomologists going to Africa to look for more

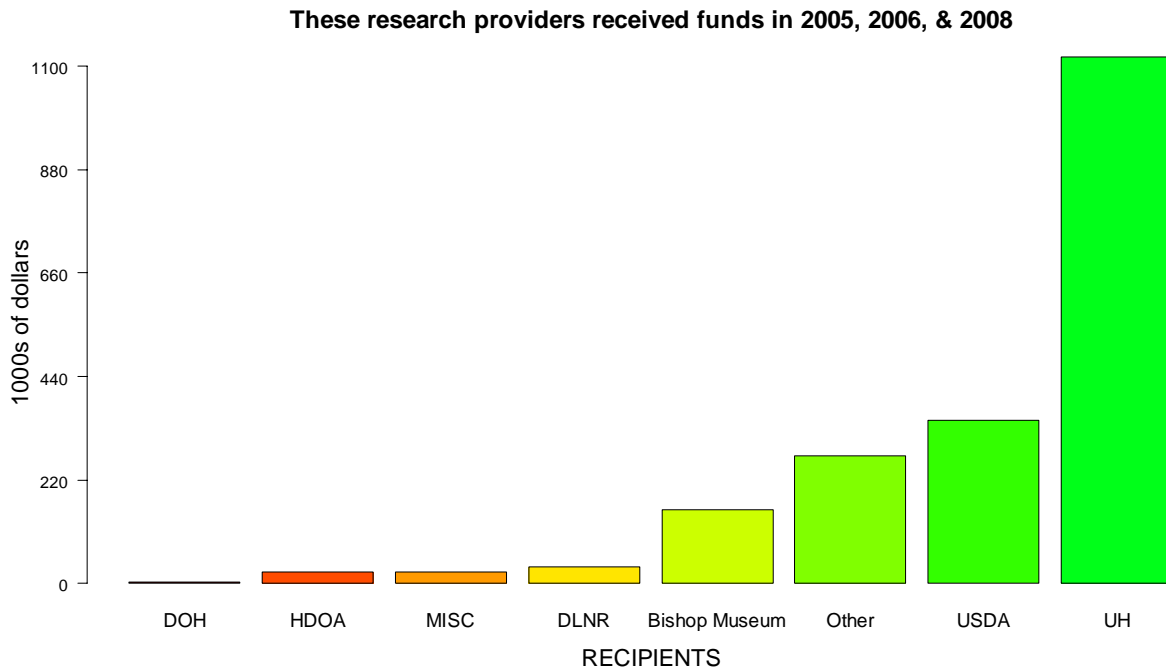
natural enemies of this serious pest in mid-2008.

- A variety of baiting techniques were tested for capturing brown treesnakes, a tool for use in preventing their introduction, suppressing populations or undertaking a rapid response should the snakes accidentally arrive in Hawaii as stowaways via air or shipping pathways. Pheromones hold some promise as an attractant.
- Non-native potentially harmful marine organisms were shown to have been introduced to the Northwestern Hawaiian Islands via ballast water or hull fouling.
- Where coqui frogs were abundant leaf litter decomposition and nutrient cycles changed, and invertebrate abundance declined. Frogs were found to be infected with a fungus implicated in the declines of frogs elsewhere, but it appeared to have little effect in terms of controlling frog populations on the Big Island. Rats were not found to eat coqui. Despite high coqui abundance mongoose ate few frogs. Cane toads did not eat coqui. Repeated aerial treatments with 11% citric acid were found to effectively control frogs, but reinfestation from untreated areas followed.
- Ballast water was shown to be a pathway for invasive invertebrates in the Northwestern Hawaiian Islands, demonstrating the need for strict ballast water standards.

More information about research and technology grants given in 2005, 2006 and 2008 can be found at <http://www.hawaiiinvasivespecies.org/hisc/workinggroups/randt/>. About 30% of the 2005 and 2006 projects are still active.

The focus of research grants to date has been on a variety of pests. Grants given in FY05, 2006 and 2008 total \$1.98 million dollars awarded to researchers working principally on control, biocontrol, invasive species impacts, early detection and risk assessments. Eight major groups of research providers were funded with the UH receiving 55% of the funds.





Research and Technology Measures of Effectiveness

- **Number of new technologies developed and adopted for invasive species management.**
 - Ant control — New methods tried at Haleakala and on offshore islets near Oahu; eradication of a population on an offshore island appears successful.
 - Coqui control — Hot shower good for controlling frogs in plant shipments; new delivery methods tried and rates of application shown to be effective for citric acid, evidence collected that introduced predators like mongoose are not effective at controlling frogs.
 - Brown tree snake control — Pheromones and long lasting baits developed and tested only.
 - Nettle caterpillar pheromone developed for detection of male moths and delimiting population ranges.
 - See this year's research projects which may identify new technologies developed.

- **Number of biological control agents tested and introduced, as well as the effectiveness of control they provide.**

HISC-funded projects for the biocontrol of the following environmentally damaging invasive species-research continues:

| Target pest for biocontrol | Agents considered and ruled out | Agents undergoing full testing | Agents recommended for release | Agents approved for release |
|---------------------------------|---------------------------------|--------------------------------|--------------------------------|-----------------------------|
| <i>Rubus ellipticus</i> | >50 | 3 | 0 | 0 |
| <i>Miconia calvescens</i> | >75 | 10 | 0 | 0 |
| <i>Tibouchina herbacea</i> | 35 | 2 | 0 | 0 |
| <i>Quadrastichus erythrinae</i> | 39 | 3 | 2 | 1 |

- **New technology developed for prevention and control of invasive marine species.**

Already reported last year was the success of the Supersucker. Research approved in 2008 about marine invaders see above. A remote operated vehicle is used for inspecting ships hulls in certain situations, see above.

- **Number of taxa screened using standardized science-based risk assessment systems.**

See below WRAs (731 completed to date). A HISC project funded in 2005 has just been completed. A database has been compiled of global reptile and amphibian introductions for use in identifying introduction pathways and analyzing how these pathways vary spatially and temporally. Approximately 3900 literature citations are documented for 675 taxa of reptiles and amphibians outside of their native ranges, 322 of which have established new wild populations.

Public Outreach

Report on Efficacy of Public Outreach on Invasive Species

Introduction

The coordinated effort to educate the public about invasive species by the Hawaii Invasive Species Council Public Outreach Working Group (HISC POWG) staff and member agencies has been successful, as measured by professional public awareness surveys and measures of efficacy listed in the Strategic Plan.

The formation and funding of the HISC POWG has added needed capacity to statewide outreach effort in three ways: it has provided funds for dedicated outreach staff positions, funding for outreach materials and media services, and a mechanism to coordinate outreach messages and actions across the state. Outreach staff persons in each county brought invasive species information to communities via booths at public events, public presentations, news articles and stories, and radio ads and programming.

The AIST has no dedicated outreach position. AIS outreach efforts are handled directly by the AIS Coordinator or disseminated through the ISC outreach specialists on each island.

Priority Audiences

- Decision makers with the authority and means to offer support and/or enact regulations.
- Special interest groups that play an important role in introducing, promoting, or observing invasive species, e.g., transportation agencies and companies, plant and landscape trades.
- Students, the next generation of decision makers.
- The general public to raise awareness of, and concern for, invasive species issues and to foster changes in personal actions.

The HISC POWG worked to promote the following messages to the public:

- ☐ Protect Hawaii.
- ☐ Report a Pest to 643-PEST (7378).
- ☐ Don't Dump Aquarium Pets or Plants.
- ☐ Don't Plant a Pest.
- ☐ Don't Pack a Pest.
- ☐ Report Dead Birds to 211, or www.gotdeadbird.org.
- ☐ Don't Sell or Buy a Pest.
- ☐ Keep Pets Contained.
- ☐ Buy Local.
- ☐ Plant Native Species.

Public Outreach Measures of Effectiveness

1. Agency adoption of rules and policies against invasive species.
2. Adoption of Codes of Conduct by businesses.
3. Track number of print and broadcast media mentions.
4. Number of "hits" on invasive species web page.
5. Number of callers on pest hotline.
6. Number of education materials produced.
7. Number of people reached through talks and displays.
8. Results from a public awareness survey.
9. Number of invasive species educational programs and community events implemented by staff.
10. Number of volunteers recruited and/or referred to invasive species projects.

1. Agency adoption of rules and policies against invasive species.

HISC POWG staff assisted the HDOA in passage of legislation (Act 40, SLH 2008) which gives the Department the ability to add invasive plants to the list of plants that are restricted from entering the state, based on their invasive tendencies, not just because they may carry pests. Actions included a HISC outreach-staff generated HISC E-News, and partner agency staff presentations to the landscape and nursery industry associations on the benefits of this change.

2. Adoption of Codes of Conduct by businesses.

HISC POWG participants continued outreach to the plant industry on the benefits of using the Hawaii PacificWRA, which asks 49 questions about a plant to determine if it might become invasive if planted in Hawaii. The HPWRA technicians and project is sponsored by the HISC.

The CGAPS Public Information Officer, a HISC POWG participant, conducted a plant industry personnel survey in May-June of 2008 to gauge awareness and support for the various initiatives to slow the introduction and spread of invasive ornamental plants. Results from 104 completed surveys show that industry members are largely aware of one or more of the current initiatives to reduce invasive plant species in Hawaii. These results will help guide future work of the HISC POWG in the area of plant industry outreach and new agency policies.

These include:

- Hawaii PacificWRA System (HPWRA):
59% of those that answered this question had heard of the HPWRA. Of these, 91% believe that the HPWRA can provide useful information about potential invasiveness of plants in Hawaii.
- Codes of Conduct: a voluntary agreement that has been signed by some plant industry businesses with three main points: 1) Participants agree to have new plant introductions screened using the HPWRA; 2) Participants will work with conservation groups to form a short list of invasive ornamental plants that they will discontinue growing/use; and 3) Participants agree to help identify and promote non-invasive alternatives to invasive ornamental plants where possible.

42% percent of those that answered this question are participating in the Codes of Conduct project.

- Hawaii Association of Landscape Architects' (HASLA) invasive species initiative. This initiative looked at the 600 plants that had been screened by the HPWRA, and agreed to not specify in landscaping projects 134 plants that were screened as invasive or high risk of becoming invasive in Hawaii. It also provides usage and maintenance guidelines for 34 species that also received high risk scores, but that were deemed too useful/important to discontinue using.

81% of respondents are in support of this initiative.

1. One question asked if industry participants thought that adequate measures were in place that would prevent the introduction of new invasive plants.

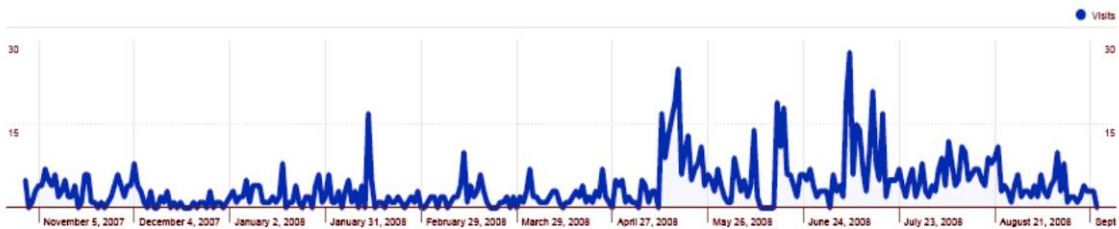
61% percent said no, 19.2% said yes, and 19.2% said they did not know.

3. Track number of print and broadcast media mentions.

HISC POWG generated, or participated in outreach efforts, that generated print, broadcast and electronic media mentions. Most print and broadcast articles also have corresponding Web site postings which maximize information delivery systems. Logged media mentions total 70. For a list see APPENDIX 1.

4. Number of "hits" on invasive species web page.

The official Web site, hawaiiinvasivespecies.org, (design partially funded by the HISC POWG and USFWS) became fully operational in Sept. 2007. **Logged Web site "hits" total 10,596.**



Site Usage

 **1,238 Visits**

 **82.63% Bounce Rate**

 **1,562 Pageviews**

 **00:00:53 Avg. Time on Site**

 **1.26 Pages/Visit**

 **90.95% % New Visits**

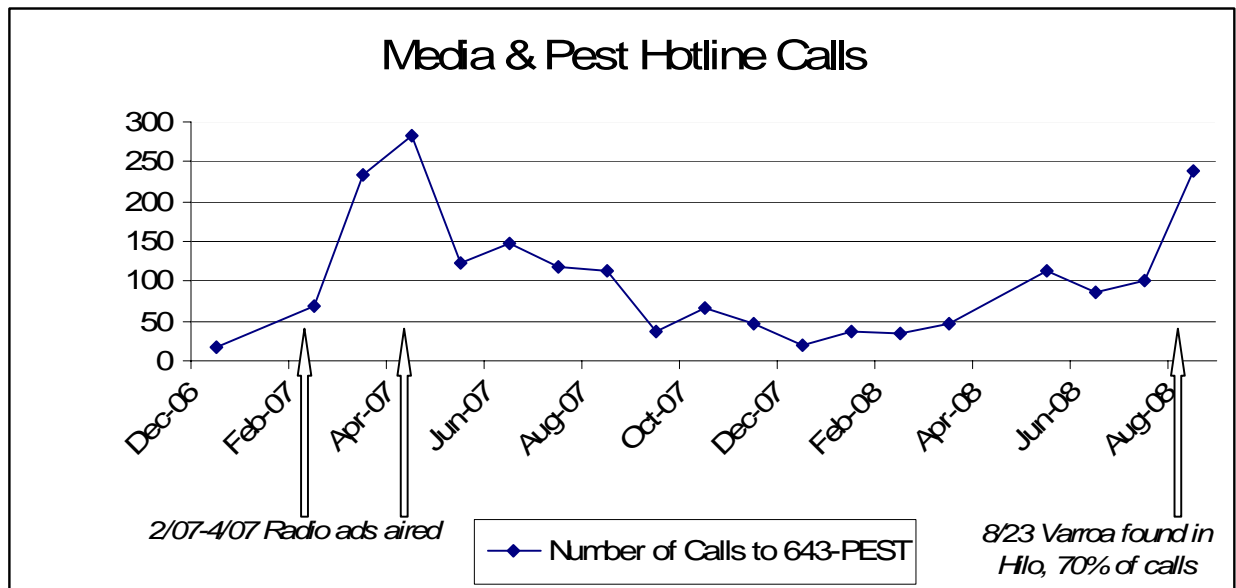
Tracking visitors to Web sites in conjunction to public outreach efforts has helped guide staff in determining the best outreach methods for various messages. One of the HISC POWG messages is aimed at increasing public awareness about (and reporting of) dead birds to aid in the early detection of West Nile Virus and avian influenza. The single message is to report dead birds to the 211 hotline, or online at www.gotdeadbird.com. HISC POWG staff and participants assisted with outreach for this message, and an effort to gain more “top-of-mind” awareness of this issue, the USFWS supported the statewide radio broadcast of a 30-second radio ad which began on May 12, 2008 and has aired on alternate weeks through November 30, 2008. Statewide radio ads have been positive, with the number of people calling to report dead birds on the rise, and the number of website visitors also on the rise since May.

5. Number of callers to the Pest Hotline, 643-PEST

One of the major goals of the HISC POWG is to form a statewide network of citizens engaged in monitoring for and reporting of invasive species. An informed public can be the crucial link in the early detection and rapid response to unwanted species, such as snakes, and can prevent new infestations of currently localized pests, such as coqui frogs and little fire ants.

Outreach staff with the HISC, DLNR, HDOA, CGAPS and the ISCs of Hawaii have worked together to promote the use of the State Pest Hotline, 643-PEST (643-7378) to report sightings of invasive species.

The 643-PEST is a direct-dial hotline number that was set up in December 2005 using HISC funds. It features a computer program that routes calls to the nearest HDOA office during normal work hours, and forwards calls to the HDOA office at the HIA for response during evening and weekend hours. This hotline is toll-free for callers and is staffed at least 20 hours per day. The previous hotline number (586-PEST, still operational) is an Oahu number, and therefore a toll-call for neighbor island callers. The 643-PEST number also features an hourly, daily and by-island log of the number of calls.



As this chart shows, calls start rising in February 2007 at 69 calls and peak in April 2007 at 284 calls per month. Also during this time, an intensive outreach effort using radio and television media was underway, from February 19 through April 7, 2007. Media buys for radio and television ads advertising the Pest Hotline number were conducted as follows, sponsored by HISC POWG except where noted:

Statewide radio PSA featuring the new Pest Hotline jingle

Broadcast dates: Feb. 19 – Apr. 8, 2007

Number of spots: 3,527

Cost: \$38,000

Television Public Service Announcement (PSA): Report a Pest—Snakes (USFWS sponsored)

Broadcast dates: Mar. 12 – Mar. 29, 2007

Number of spots: 21

Cost: \$3,200

Radio PSAs for early detection of Coqui on Oahu, Kauai

Broadcast dates: Mar. 19 – Apr. 1, 2007 (Oahu), Mar. 26 – Apr. 8, 2007 (Kauai)

Number of spots: 120 (Oahu), 708 (Kauai)

Cost: \$9,000

Television PSA: Report a Pest—Snakes (USFWS and Earthlink sponsored)

Broadcast dates: Aug. 27 – Nov. 24, 2007 on KITV only

Number of spots: 148 (29 spots featured the Pest Hotline)

Cost: \$15,000 (CGAPS used USFWS funds and partnered with Earthlink, who sponsored an additional 50K in broadcast time for this campaign)

Since the conclusion of these media outreach efforts, there have been no media buys for Pest Hotline outreach. There are correspondingly low numbers of calls to the Pest Hotline until August 23, 2008 when the first varroa mites are reported in Hilo. This resulted in a 70% increase in calls to the Pest Hotline from the Big Island from August 23 to the end of the month. Without

similar problems covered by the news media, Hotline usage remains low. Because of this ongoing trend, the HISC POWG has requested that the radio pest hotline jingle be aired again using outreach funds.

6. Number of education materials produced.

Materials range from refrigerator magnets, key rings, and pens to posters, brochures, displays and printed and portable document format (PDF) newsletters, as well as a statewide HTML email newsletter. Logged education material produced total 66. For details see APPENDIX 1.

7. Number of people reached through talks and displays.

Various public events provide opportunities for engaging the public on invasive species issues. Logged estimates of people reached through talks and displays total 31,258. For details see APPENDIX 1.

8. Public awareness surveys.

In 2004, 2006 and 2007 outreach efficacy has been measured by CGAPS and the HISC POWG using professional research companies to conduct periodic telephone surveys of a representative number of residents statewide, to gain a sense of public awareness, concern, and support. Funding for the 2007 survey was provided by the HISC POWG, and results may be found at <http://www.hawaiiinvasivespecies.org/cgaps/whitepapersreports.html>. Funding for the next statewide survey has been secured from the USFWS, and will be conducted in 2008.

9. Number of invasive species educational programs and community events implemented by staff.

Logged number of educational programs and events totals 58. For details see APPENDIX 1.

10. Number of volunteers recruited and/or referred to invasive species projects.

A statewide total of 2612 volunteer hours have been logged.

OISC

Number of volunteer hours contributed to invasive species programs: 1,033.5 hours

MISC

Volunteers contributed over 242 hours in the control of invasive species.

Volunteer work included structured service trips as well as individuals who spent days working alongside field staff. Partner agencies also contributed significantly to MISC operations, logging over 1,204 hours.

BIISC

4 volunteers who assisted at outreach events

AIS

100 Reef Check volunteers

OUTREACH GRANTS IN 2007-2008

HISC public working group evaluation committee completed a review (late in 2007) of 10 outreach proposals following request for proposals (RFP). Reviewers looked at some or all of the proposals, including staff and experts from HDOA, DOH, DLNR, HISC, Invasive Species Committees, and CGAPS. The intention was to encourage community groups to get reach the public with invasive species messages especially those outlined in the strategy. Unlike the Research and Technology grants this RFP was not so well subscribed, perhaps due to the smaller amount of funds available for each grant. In 2008-2009 no RFP will be done, outreach staff involved in this working group will work with local community groups as needed to promote the messages. Nine projects were selected (below) for funding. The total amount funded in 2007-2008 came to \$62,796. Principal investigator surname and agency are indicated after proposal titles:

Campaign to Protect Native Birds from Domesticated Birds Gone Wild – Uyehara/ Wildlife Society, Hawaii Chapter

Summary: The Wildlife Society, Hawaii Chapter, in partnership with Mālama Hawaii, will produce a multimedia campaign to protect native waterbirds from the invasion of domesticated birds gone wild. Releasing pet ducks into the wild has created major problems for the endangered Koloa as cross-breeding threatens the species with genetic extinction, and adds competition for food, nesting sites and wetlands habitat. \$9,933

Invasive Species Public Announcements – Browning/Imi Pono No Ka Aina

Summary: This project will fund one-minute daily PSAs played on a popular Big Island radio station and a three-day teacher education workshop held in partnership with the DLNR, Natural Area Reserves Program and The Nature Conservancy. The effort will help educate the people of the Big Island about invasive species and the uniqueness of native Hawaiian ecosystems. \$6,377

Early Detection Field Guide – T. Penniman/Tri-Isle

Summary: MISC will partner with the U.S. Geological Survey (USGS)-Pacific Basin Information Node to create early detection workshops for the public and to create an *Early Detection Field Guide* for use in training. Early detection of incipient invasions by the public and staff of conservation organizations can help eradicate or contain invasive species before control becomes technically or financially impossible if participants know what to look for and how to report their observations. \$6,225

Early Detection of Aquatic Species – Komoto/Malama Kai Foundation

Summary: This project will assist a statewide citizen monitoring network of ocean users in the early detection and distribution of aquatic invasive species on Hawaii Island, as well as the production of outreach materials to aid their identification. Aquatic invasive species are presently limited there, but a rising population and increased vessel traffic places greater risk for introductions and spread. \$4,470

“Non-Native or Illegal Pet Amnesty Day” Event – Wendland/Hon Zoological Society

Summary: A one-day event outside the Honolulu Zoo will showcase educational exhibits about the intentional release of pets by owners who cannot or will not care for them. This practice is a well-documented vector for invasive species in Hawaii. These pet species present a wide variety of problems for native ecosystems, including out-competing natives for food and habitat, preying on natives or altering habitats. \$6,671.50

Early Detection of Forest Pests in Urban Forests of Oahu – Hauff/UH-PCSU

Summary: This project will improve detection of new forest disease and insect pests in urban forests on Oahu by educating landscapers and arborists on how to report a pest using the “Report a Pest to 643-PEST” message. With on-going introductions of alien plant diseases and insect pests causing damage to Hawaii’s urban and natural forests, there is a need for improved detection and response. \$10,000

Spreading the Word, Not Weeds – Taddonio/National Tropical Botanical Garden (NTBG)

Summary: This effort promotes educational efforts to identify invasive species targets by augmenting environmental education curriculum in Kauai classrooms and enhancing public outreach. NTBG will focus on specific targets that pose the greatest threat to Kauai and impact Hawaiian ecosystems, engage young people in learning about native Hawaiian biodiversity, and create opportunities for removing invasive species and planting native species. \$5,100

The STOPP (Stem the Tide of Plant Pests) Program – Dunn/UH

Summary: The Lyon Arboretum will create a community-based weed awareness and control program (STOPP) with printed outreach products, training and activities that communicate the consequences of invasive species, minimize the possibility of pest introductions, promote awareness and reporting of pests, and increase community involvement. A well-informed public, armed with accurate information and tools to allow identification of known and potentially invasive plants aids control and eradication. \$10,000

Malami I Ke Kai (Care for the Ocean) – Hashimoto/Kai Makana

Summary: Kai Makana will partner with various organizations and government agencies to restore the natural environment of Mokauea Island located in Keehi Lagoon off Oahu. The project includes work trips to remove invasive plants, plant natives and clean up; educational brochures; and a walking path with weatherproof signage about invasive and native Hawaiian plants. Long thorn kiawe, mangrove, pickleweed, alien limu and marine debris have degraded the island’s fishpond, coastline and farming areas. \$4,200

Resources Working Group

Resources Goals: (1) Determine levels of resources spent on invasive species (2) Determine resource needs statewide (3) Seek public and private sector funding for invasive species management and control programs to support priority programs; and (4) Share knowledge and expertise. A more detailed list of goals can be found in the HISC Strategy 2008-2013.

Resources Measures of Effectiveness

Reports to the legislature regarding invasive species spending and resource shortfalls.

This is legislatively mandated. See this report: Organizational and Resource Shortfalls. Last year's report on spending was not updated.

Approval of annual budget for recommendation to the Council.

A budget recommendation was made by the Resources Working Group chair to the HISC following an interagency meeting on August 14th 2008 to consider budgets recommended by all of the working group chairs. Demands on the budget were higher than available funds and agreeing on a balanced budget required a collaborative approach. The final budget recommendation was approved by the Council on September 3, 2008. Details are presented below in HISC Budgetary Matters.

Attendance at meetings of member and collaborating agencies.

All member agencies attended meetings of the Resources Working Group.

Agency adoption of innovative projects initiated through HISC.

The Council and its working groups will and support the implementation of the HISC Strategy 2008-2013. It preferentially supports innovative projects and those that target gaps in capacity, rather than the simple augmentation of existing invasive species management capacity.

The long-term goal is that successful innovative projects funded by the HISC will eventually be adopted by lead agencies within their budgets. The resources working group seeks to consider this in its oversight of the budget recommendations that are made to HISC. In this way HISC funds can continue to be available to address gaps and provide innovation via funding of demonstration projects. This was demonstrated by HDOA's biosecurity initiative which was initially supported via HISC funds and later was adopted and directly funded by the Legislature.

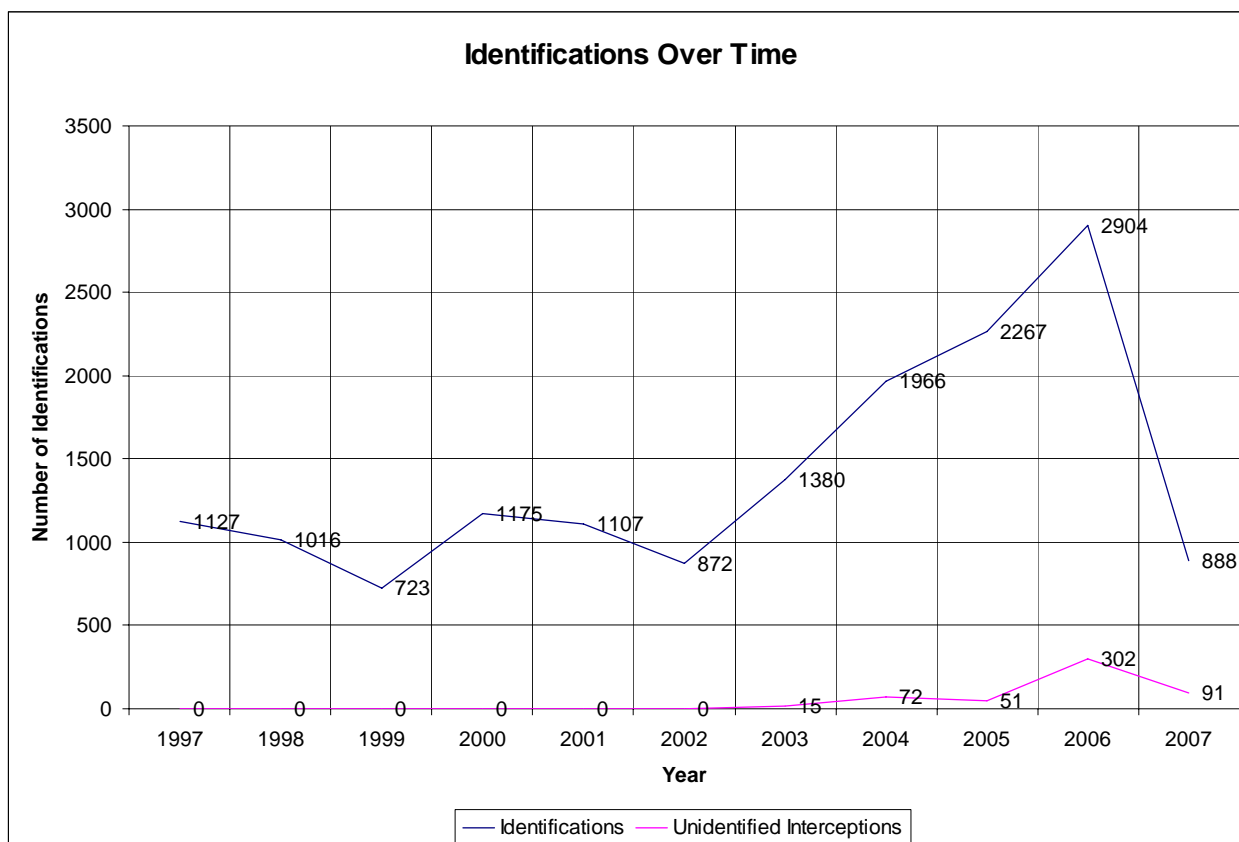
OVERVIEW OF THE INVASIVE SPECIES PROBLEM IN HAWAII

The silent invasion of Hawaii by insects, disease organisms, snakes, weeds, and other pests is the single greatest threat to Hawaii's economy, natural environment and to the health and lifestyle of Hawaii's people. Pests already cause millions of dollars in crop losses, the extinction of native species, the destruction of native forests, and the spread of disease, but many more harmful pests now threaten to invade Hawaii and wreak further damage. Even one new pest—like the brown tree snake, or the red imported fire ant—could forever change the character of our islands. Stopping the influx of new pests and containing their spread is essential to Hawaii's future well-being.

Despite the efforts of state, federal, and private agencies, unwanted alien pests are still entering Hawaii at an alarming rate. In 1993, the Federal Office of Technology Assessment declared

Hawaii's alien pest species problem the worst in the Nation. Hawaii's evolutionary isolation from continents and its modern role as the commercial hub of the Pacific make these islands particularly vulnerable to destruction by alien pests. Much progress has been made lately but gaps remain in current pest prevention systems and a lack of public and institutional awareness exacerbates the problem.

For example, approximately 3,400 insects, spiders or mites are confirmed established in Hawaii. More may be present in Hawaii but there are few entomologists with the ability to find and identify insects. At least 15 species establish every year and a proportion of those are likely to be considered nuisance species. Hundreds and sometimes thousands of arthropod species are detected every year in goods shipped to Hawaii.



This graph shows the number of arthropod species intercepted in incoming freight (DOA). Spikes in interceptions reflect risk assessment work, some of which was funded by HISC.

At least two serious arthropod pests have arrived every year for the last 10 years and more may be discovered. To prevent further introductions, more needs to be done to manage pathways, including building inspection and treatment infrastructure into Hawaii's ports, inspections and treatment of at risk goods, and research into risk abatement strategies.

Invasive arthropod pests new to Hawaii in the last 10 years

- | | |
|---|---|
| ■ White Peach Scale – 1997 | ■ Glassy-Winged Sharpshooter – 2004 |
| ■ Sago Palm Scale – 1998 | ■ Macadamia Felted Coccid – 2005 |
| ■ Little Fire Ant – 1999 | ■ <i>Erythrina</i> Gall Wasp – 2005 |
| ■ Citrus Leafminer – 2000 | ■ <u>Thrips Parvispinus</u> – 2006 |
| ■ Nettle Caterpillar – 2001 | ■ Asian Citrus Psyllid – 2006 |
| ■ Giant Whitefly – 2002 | ■ Varroa Mite – 2007 |
| ■ Pickleworm – 2003 | ■ Whitefly Parasitoid – 2007 |
| ■ Cardin's Whitefly – 2003 | ■ Thrips, <i>Dichromothrips smithi</i> – 2007 |
| ■ Papaya Mealybug – 2004 | ■ Scarabaeid Beetle, <i>Cyclocephala</i> |
| ■ <u><i>Aedes japonicus</i> (Type of Mosquito)</u> – 2004 | <i>pasadenae</i> – 2007 |
| ■ <u><i>Large Orange Sulfur</i> – 2004</u> | ■ Scarabaeid Beetle, <i>Temnorhynchus</i> |
| | <i>retusus</i> – 2007 |
-

More than 10,000 flowering plants have been introduced into Hawaii from the temperate or tropical zones of every major continent and about 1,215 have established wild populations in Hawaii. New species continue to be introduced by plant collectors, gardeners and the nursery industry. Formerly cultivated species are “jumping the fence” and establishing self-sustaining populations. A subset of 107 plant species is considered serious invaders occupying space and competing with native plants in natural areas. Many form the principal dominant canopy species in some situations. Of these, more than 91% were intentionally introduced to Hawaii as ornamentals, forestry trees, medicinal plants, food sources or other uses. Many arrive and fail to find the right combination of circumstances to allow establishment in the wild and persist only in cultivation. WRA systems have been developed in recent years that allow us to predict which species are likely to cause problems (see **WRA**).

At least 19 alien mammals are established in the wild. A few feral species have far reaching impacts in natural areas altering forest composition and structure; damaging and consuming rare species that occur only in Hawaii. Many act as vectors of diseases that affect people and domestic animals. Rats, mongoose, feral goats, sheep, deer, pigs, and cats impact native ecosystems and bring threatened species closer to extinction. Other terrestrial vertebrate species, including birds (55 species), reptiles (24 species) and amphibians (six species), are established in Hawaii in surprising numbers; they impact natural area values and the economy. Priority and urgency should be given to the eradication of incipient populations, island-wide eradications of vertebrates, and finally management of areas with high native biodiversity, cultural, social or economic value.

A number of diseases are common around the world and have not arrived in Hawaii. Avian influenza, dengue and WNV are examples, all vectored by insects and animals.

Early detection of invasive species

Past efforts to detect new invasive species as they are in the initial stages of establishing in Hawaii have been limited. One example of an established detection program has been HDOA's

efforts to survey for new pest insects and new plant and animal diseases of significance to agriculture. Occasional funding has allowed for specific surveys for new snail species, ants or other taxa, usually as a stand-alone project and not as an ongoing effort.

Systematic island-wide surveys for new species that are carried out frequently enough to allow an effective response have been lacking especially for species other than those mentioned previously. The most comprehensive effort to resolve this gap has been to build on several limited-term projects that focused on identifying the locations and extent of populations of plants known to have been planted in Hawaii that have been identified by a WRA process to pose a threat to native ecosystems. These surveys covered specific areas once, specifically for vascular plants, creating a framework of agencies and data management that will ensure that they become incorporated as regular monitoring that is tied to an effective rapid response capability.

In 2006, early detection projects for new invasive plant species that may have been introduced via arboreta, nurseries or residential plantings were initiated on Oahu, the Big Island and Kauai. Maui completed roadside surveys in 2002 and is ready to resurvey and evaluate rapid response targets following the success of their first round of island-wide eradication efforts. Lanai and Molokai have had complete roadside surveys in the past two years. The Big Island is in the initial stages and results of these first surveys will be available next year. Detecting species when they are limited to a few individuals or cover less than 10 acres increases the likelihood of an eradication effort by several orders of magnitude. Early detection and roadside survey programs for plants have been implemented on all islands and work continues in 2008-2009 to determine which species may become invasive and if they may be eradicable. County early detection programs for potentially invasive and incipient plants included searches for 90 species on Kauai, Oahu (140 species), Maui (150+ species), and the Big Island (134 species).

Future directions for this program will include; increasing taxonomic capacity to improve the identification of new species, creating a reporting system to link agencies and track the response to create better accountability, increasing the resources put toward surveying for insects, vertebrates and diseases, and increasing the training and preparedness for interagency response to newly established invasive species.

Prevention (quarantine) improvements to reduce the frequency of harmful introductions

Preventing invasive species introductions is considered a priority. At present responsibilities for preventative measures fall on HDOA and USDA. There is a great value in preventing the introduction of a new invader, pest or disease since the cost of its impacts and management can be avoided. It is widely agreed that prevention is cheaper than controlling a given invasive species or living with its impacts. Typically the responsibility of prevention falls with government as specific authority is needed to regulate trade. This public good effort is needed because the harmful effects and costs of an invasive species are borne by everyone even if the introduction of a species could be traced back to one individual or business. Individuals or businesses are unlikely to self regulate, due to a lack of awareness or an inability to predict the invasiveness of a species, and that the negative impacts of the species introduced by their actions may not affect them directly.

Improvements to the prevention systems in Hawaii provides the greatest opportunity to reduce number and frequency of invasive species introductions, as well as confining the impacts of established invasive species to one or a few islands instead of allowing them to spread statewide. Recent doubling in inspection staff at HDOA per the biosecurity effort first funded for \$2,400,000 in 2006 should lead to improvements. The value of increased prevention is the avoidance of costs associated with the invaders should they arrive.

House Bill 2843 was passed into law (Act 3, Special Session Laws of Hawaii (SSLH), 2008). It expands the items subject to an inspection fee to include any freight brought into the state and requires the inspection fee to be assessed based on net weight of imported freight. It designates the person paying the freight charges to a transportation company as the party responsible for paying the fee and clarifies that the transportation company is not liable for the fee in the event the party responsible for the fee fails to pay it. This new law is consistent with the recommendation of the Governor's Economic Momentum Commission report.

Control of alien species affecting native forest ecosystems

The control of widespread pests to protect valued high priority sites and resources can provide significant measurable benefits and can now be implemented either island-wide or over large watershed scale areas. Control of widespread species usually implies long-term investment since reinvasion is continuous and maintaining target species at levels below which their impacts are felt is often costly.

From:

**Hawaii's Comprehensive Wildlife Conservation Strategy
October 1, 2005**

Habitat Modifiers: Invasive Plants and Ungulate Grazers and Browsers

One of the major threats to Hawaii's native species and forests is the uncontrolled spread of many invasive non-native plants. These plants displace Hawaii's distinctive native flora, resulting in a loss of species diversity and eventually in more pronounced and permanent changes to ecosystem function, such as alteration of primary productivity and nutrient cycling. Many invasive species completely replace native vegetation resulting in total loss of native habitats. Invasive plants such as fire-adapted fountain grass (*Pennisetum setaceum*) and orchard grass (*Dactylis glomerata*) provide fuels for fires and often increase in abundance after fires. A short list of invasive plant species that pose a significant threat to native plant communities and require aggressive management include miconia (*Miconia calvescens*), firetree (*Morella faya*), fountain grass (*Pennisetum setaceum*), banana poka (*Passiflora tarminiana*), blackberry (*Rubus argutus*), mangrove (*Bruguiera gymnorhiza* and *Rhizophora mangle*), strawberry guava (*Psidium cattleianum*), and golden crown-beard (*Verbesina encelioides*); there are many other invasive plants that degrade and destroy native habitat. Because the seeds of many invasive plants persist for years, eradication is exceedingly difficult after the plant is established and control requires an ongoing effort to prevent further spread. However, control operations are

expensive; for example, the current expenditures to control miconia on Maui alone are \$1 million a year.

Established ungulates (hooved animals) are another major threat to native habitat. Ungulates in Hawaii include pigs (*Sus scrofa*), goats (*Capra hircus*), sheep (*Ovis aries*), mouflon sheep (*Ovis musimon*), deer (*Odocoileus hemionus* and *Axis axis*), and to a lesser extent, feral cattle (*Bos taurus*). Ungulates directly and indirectly affect native ecosystems in a variety of ways. These effects include damaging vegetation by grazing and browsing, trampling seedlings and aquatic invertebrates, spreading non-native plant seeds, disturbing soil, and increasing erosion. These activities can affect the amount of light and moisture levels within forests, as well as nutrient cycling, and result in modified or destroyed plant and animal communities, decreased water retention of soils, erosion, and decreased water quality. In addition, pigs have been observed destroying the nests of ground-nesting birds (e.g., nene) and have been linked to the spread of mosquito-borne avian disease (i.e., pig wallows creating mosquito breeding habitat). Because Hawaiian plants only recently have been exposed to the effects of grazing, as they lack common defenses such as thorns or toxins. Thus, grazing and browsing animals often prefer native plants over non-native plants. Grazing and browsing can result in the extirpation of native plant populations, but even low intensity browsing can affect the species composition of habitats and encourage a shift in dominance from native toward non-native species. Non-ungulate herbivores, such as rabbits (*Oryctolagus cuniculus*), can have the same impact. Soil disturbance by rooting animals (typically pigs) occurs throughout Hawaii and favors the germination and establishment of alien plant species, many of which are adapted to such disturbances and may require disturbance to complete their life cycle. Conversely, native species are not adapted to such disturbances and tend to be negatively affected. This in turn affects the composition of plant communities, which indirectly affects the animals that depend on the community; effects on native invertebrates may be particularly acute. Removal of ungulates is often the first step in ecosystem restoration and usually results in the recovery of native habitat, as well as the decline of particular alien plants.

The distribution of ungulates varies across the landscape. Subalpine communities have been and continue to be affected by feral goats, mouflon sheep, and feral pigs. Montane and lowland mesic forests on Kauai and Maui are impacted by the spread of axis deer. Dryland forests have suffered greatly because of cattle and goats. Feral pigs typically affect wetter communities, and their effects are widespread throughout the Islands. Control of animal populations is difficult and expensive, given high rates of reproduction and the ability of these animals to hide. Invasive algae species have become a threat in recent years. These organisms can out-compete and overgrow native algae species and kill corals, altering the structure of local coral reef communities. Nearshore eutrophication (water pollution caused by excessive nutrients that stimulate excessive plant growth) from non-point source pollution or leaking cesspools and sewage systems may contribute to the explosive growth of these algae. Leeward areas of Maui and areas in Kaneohe Bay, Oahu and Waikiki, Oahu have experienced algal blooms or have growing invasive algae populations. Another marine invasive, snowflake coral (*Carijoa* sp.), out-competes and overgrows native coral species, possibly including the precious black corals found in deeper waters off Maui.

Introduced Predators

Hawaiian terrestrial animals evolved in the total absence of mammalian predators and are extremely vulnerable to predation by these introduced species, especially rats (*Rattus* spp.) and feral cats (*Felis silvestris*), and to a lesser extent, mongooses (*Herpestes auropunctatus*). All of these species prey on eggs, nestlings and adult birds, limiting populations. Rats have been implicated in the decline in native bird populations in the early 1900s. Rats are ubiquitous throughout Hawaiian habitat and while rats are commonly known to prey on seabirds, waterbirds and forest birds, even climbing into trees to prey upon canopy-nesting species, they are also known predators of native tree snails and other native invertebrates. Rats also eat the seeds of a large number of native plant species, limiting their regeneration. Feral cats are extremely skilled predators and have been responsible for the extinction of birds on other islands. In Hawaii, cats are widely distributed and are found throughout bird habitat on all of the Main Hawaiian Islands (MHI) from sea level to high elevation. While a single cat can have a devastating effect on a breeding seabird colony, “cat colonies” pose an even greater threat to bird populations because of their concentrated sheer numbers. Although less arboreal than rats, mongooses are efficient predators. With few rare exceptions, populations of nene (Hawaiian goose), waterbirds and seabirds do not persist long in areas where mongooses are present. Presently, high densities of feral cats, rodents, and mongooses are a major cause of mortality among native birds and may place similar pressures on native terrestrial invertebrates. In general, Hawaiian bird species have low reproduction rates, so increased predation can be particularly problematic. Other predators that pose ongoing threats to native bird species include feral and unleashed dogs (*Canis familiaris*), cattle egrets (*Bubulcus ibis*), barn owls (*Tyto alba*), frogs and pigs. Fortunately, snakes have yet to become established in the Islands. Given that the brown treesnake (*Boiga irregularis*) effectively caused the extinction of Guam’s avifauna, it is expected that the successful establishment of predatory snakes in Hawaii would have equally devastating consequences.

Introduced fishes have been documented to prey on native freshwater fishes and invertebrates, while introduced frogs, such as the coqui, prey on aquatic and terrestrial invertebrates. Anchialine ponds are threatened by introduced fishes and shrimps that prey on the native shrimp and alter the habitat structure. Over the last 200 years, introductions of invertebrates, including ants, snails and wasps, have been extensive throughout the archipelago. Many of these species prey on, or parasitize, native invertebrates. Biologists have long suspected that these introductions caused declines in native insects and snails and had indirect community-level effects. Scientists in the last century, for example, noted extensive declines in native moths after introductions of predatory arthropods. These declines were followed by declines in native birds that preyed on the native moths.

More recently, studies have documented the effects of introduced ants and vespid wasps on native arthropod fauna and on nesting birds; for example, introduced ants have been documented killing nestlings.

Disease Carriers, Disease and Pathogens

The introduction of mosquitoes (*Culex quinquefasciatus*) to the Hawaiian Islands in 1826 had a profound effect on native forest birds and continues to affect the distribution and abundance of many bird species. By serving as vectors for avian malaria (*Plasmodium relictum*) and avian poxvirus (*Poxvirus avium*), mosquitoes effectively spread these diseases throughout lowland areas. Many species of introduced birds now present in Hawaii may provide effective reservoirs for these diseases, allowing them to persist and spread widely. For Hawaiian birds that had evolved in the absence of these diseases for millions of years, the impacts were severe. Over the next 150 years, many bird species became extinct. Today, most of the remaining native forest birds persist at elevations above 1,600 meters (5,000 feet), where few mosquitoes can survive.

In recent years, a few species have begun to recolonize lower elevations where avian malaria and poxvirus are common, indicating that at least some species may have developed resistance to these diseases. However, global warming could enable transmission of poxvirus and malaria to higher elevations, threatening remaining populations of endangered birds. New vectors of such diseases are also of concern. On the Big Island, the recent establishment of *Aedes japonicus*, the state's first truly temperate mosquito, may extend the range of mosquito-borne disease into currently mosquito-free high elevation forests.

Other diseases impact native wildlife. For example, avian botulism is the most prevalent disease in Hawaii for native waterbirds. The introduction of WNV could have even more devastating impacts. Threat by disease is not limited to terrestrial fauna, however. Recent work has shown that many species of corals have diseases that, in some cases, are on the increase and may be caused by introduced species. Honu (*Chelonia mydas agassizi* [green sea turtles]) in most areas suffer from fibropapilloma, which may also be caused by an introduced disease. With little natural resistance to disease, the Hawaiian fauna is expected to be highly susceptible, and prevention of the establishment of new diseases is a top priority need.

Biocontrol

USDA and HDOA are the only two agencies with capacity in this area at present; so, to a lesser extent, is UH. The building of biocontrol containment facilities is needed. Current facilities are inadequate to combat widespread species for which chemical and mechanical control is not cost effective. Biocontrol has high up-front costs since researchers must ascertain the agent's specificity and safety. However, the control of target organisms is continuous once an agent is successfully established in Hawaii, and the method is cost effective, removes the need to use harmful pesticides, and allows us to better live with invasive species and pests that are present in Hawaii.

Biocontrol is one of the least understood tools for the control of invasive weeds and other pests yet it can be one of the most successful means of controlling widespread invasive species throughout its range. Myths and misconceptions that have been nearly impossible to dispel (i.e., that the mongoose and cane toad were introduced into Hawaii, with disastrous results, as part of biocontrol programs) offsets the very successful track record of biological control in Hawaii dating back to the reign of King David Kalakaua. A successful biological control program

reduces or, in some cases, removes the need for conventional methods of control for an invasive species. It is targeted to a particular species or group of closely related species (usually plants or invertebrates) and, once established, the agents continue to provide benefits with no external inputs. The comprehensive testing systems now available allow us to select agents that are highly specific to the targeted invasive species.

In Hawaii, two principles of biocontrol are followed: classical biocontrol and augmentative biocontrol. Classical biocontrol involves the identification use of natural enemies (either insects or diseases) within the native range of a pest for release into the environment the pest has established itself in. This process either requires exploration or collaboration. At the present time, foreign exploration is limited to one exploratory entomologist in the state of Hawaii. Foreign exploration has an annual budget of \$50,000 a year. HISC has funded exploratory projects conducted by HDOA and UH. The second form of biocontrol, augmentative biocontrol, involves the collection and releasing for distribution, biological control agents already established but of limited distribution. HDOA conducts projects such as this for newly established pests with natural enemies that are already established. One recent and successful augmentation project is the biocontrol of the papaya mealybug, a severe pest of papaya and plumeria in Hawaii.

Not all pests are suitable targets for biological control. Generally, targets for biological control are intractable or difficult to manage with other techniques. Targets for biological control include such pests as fireweed, strawberry guava, miconia, ivy gourd, *Erythrina* gall wasp, nettle caterpillar and others. These pests are wide spread and difficult or impossible to control through either chemical or mechanical means. High costs are seen on exploration and identification of potential control agents; however, the total financial costs of biocontrol are far more affordable than traditional control methods as once an agent is released and established no additional inputs should be required. The usage of chemicals for control of pests can lead to several long-term issues including chemical contamination of the ground and/or water, development of chemical resistance, and potential non-target effects of the chemical being used. Even mechanical methods can have similar secondary effects. In contrast, the standards adhered to by modern day practitioners has seen the development of agents with no known non-target effects. When biocontrol is an option, it is by far the safest and most financially affordable control technique.

Growing awareness of the need for improved inter-island quarantine

Often invasive species arrive to one particular island in Hawaii and become problems there but may not be transported to neighbor islands for years. Varroa mite, a parasite of honey bees, was found on the Big Island mid-year 2008 after being detected on Oahu more than a year earlier. The pathway for this introduction was most likely from the interisland movement of goods from Oahu. The queen bee and honey businesses are worth several million dollars a year on the Big Island, and this serious bee pest will have severe negative impacts on that industry. In the 2008-2009 budget HISC approved funds (\$53,400) for HDOA to implement more inspections and control efforts for bee pests. Interisland movements of cargo increase the risk of moving materials and products that spread invasive species. This highlights the need for increased inter-island quarantine to prevent the introduction of known pests to unfested islands from all sources.

The risk posed by the inter-island movement of vessels, vehicles and materials can be mitigated. Additional quarantine inspectors are needed to effectively screen the volume of inter-island cargo. A review of current authorities is needed to ensure that action can be taken to mitigate the risk posed by all vehicles and materials moved inter-island. Infrastructure improvements at ports can provide both inspection areas and the facilities for treating products (e.g., a car wash) prior to moving materials between islands. Consistently utilizing the natural barriers between islands to prevent the spread of invasive species will help reduce the impacts of invasive species statewide. HISC provides a forum for the agencies involved in transportation, regulation, and conservation to coordinate their efforts to achieve the most effective level of protection for Hawaii's agricultural production, environment and human health.

Increased threat of brown treesnake from Guam

Efforts in Guam to prevent the introduction of brown treesnakes to Hawaii and other islands were at risk when budget arrangements for paying the USDA inspectors' salaries fell through early in 2007. The problem was averted later in the year. However, recent plans to move the entire military base at Okinawa to Guam will lead to the creation of whole new towns in Guam. A large increase in the movement of people and cargo to and from Guam is expected to exceed the capacity of current inspection teams. USDA is working with DOD to manage the issue and increase prevention efforts. This issue continues to be addressed in 2008-2009 as we speak.

INTERIM PLAN UPDATE

- In 2003, an interim strategic plan was approved by HISC to address alien species in the state, and to guide HISC implementation of its responsibilities.
- In July 2008 the HISC approved the adoption of the HISC Strategy 2008-2013.
- Lead agencies are identified in the HISC Strategy 2008-2013

COQUI FROGS

The Puerto Rican tree frog, *Eleutherodactylus coqui*, has the potential to change native forest ecosystems. Population densities in some areas of Hawaii have been recorded to be as high as 3 times the density in Puerto Rico and their nightly mating choruses can reach levels as high as 73 db, which is comparable to moderate to heavy vehicle traffic. Economic effects on the Big Island, stemming from their nightly choruses, have been felt through declining property values and a reduction of plant sales from nurseries. The ecological effects are not fully realized though negative effects have been documented via research funded by HISC. A high priority for management is to prevent their establishment into high value natural areas and keep them off islands where they are not yet established.

A coordinated approach to coqui frog management is outlined in the Hawaii's Coqui Frog Management, Research and Education Plan:

<http://www.hawaiiinvasivespecies.org/hisc/pdfs/20071217coquiplandraft.pdf>

By far, the worst coqui frog problem is on the Big Island, but Maui has a long-established population in a limited area; work on Oahu and Kauai has so far kept populations from

establishing. The main goal on the Big Island is to keep pristine natural areas free of the frogs, and to help the community control frogs around residential areas. On the other islands, the aim is to prevent the establishment and to eradicate all known populations of frogs. HDOA, counties and the ISCs work together to control populations on all islands and prevent interisland movement of frogs by treating goods that originate from the Big Island. Away from the Big Island, most frogs arrive in shipments of nursery plants that come via the Big Island. A hot water treatment method, which was developed by a nurseryman on Oahu using HISC research and technology funds, is now in use for this purpose. Typically, HDOA and ISCs maintain close contact with nurseries to prevent establishment or export of frogs.

During the legislative session in 2008, Chapter 194, HRS, the law for HISC, was modified to include (underlined below) references to systematic management of coqui frogs on public lands near residential communities:

Section 192-2 (a) (4) After consulting with appropriate state agencies, create and implement a plan that includes the prevention, early detection, rapid response, control, enforcement, and education of the public with respect to invasive species, as well as fashion a mission statement articulating the state's position against invasive species; provided that the appropriate state agencies shall collaborate with the counties and communities to develop and implement a systematic approach to reduce and control coqui frog infestations on public lands that are near or adjacent to communities, and shall provide annual reports on the progress made in achieving this objective.

This part of the HISC report documents that a systematic and collaborative approach has been employed to control frogs on the Big Island and Maui and prevents establishment on other islands. Clearly, with so much land on the Big Island infested (see map), the efforts to control frogs are only practical in a limited number of sites.

The Big Island coqui crew is based with the BIISC and coordinates control outreach and reporting efforts:

- Maintains interagency databases and develops maps for the coqui hotline calls, road surveys and control efforts.
- The control operations are contracted to the USFWS.
 - Targets high-value natural areas and state land near residential areas.
 - Eradicated 5 incipient populations.
 - Controlled a total area of 62 acres.
 - Conducted 536 miles of road surveys.
- The establishment of a coqui barrier fence around the Kulani Prison parking lot to prevent the spread of frogs into the prison area.
- Conducted nursery control and support in Waimea.
- Supplied support for community organizations in Honokaa and Volcano Village.
- Sprayed buffer zones around state park parking lots to prevent spreading the frogs on vehicles.

Additional details are provided about the Big Island, Oahu, Kauai and Maui control efforts in this report under each of the Invasive Species Committees sections above. Additional coqui control work by HDOA has also occurred but is not reported here; often control efforts are carried out cooperatively between invasive species committees, HDOA, nursery owners and community groups.

IDENTIFICATION OF ALL INVASIVE SPECIES IN THE STATE

Bishop Museum staff regularly published estimates of alien species of plants, animals, and invertebrates growing wild in Hawaii. However, they did not measure the relative harmfulness (i.e., invasiveness of each species), which means that their information has limited application for management purposes. The Hawaii Ecosystems at Risk website <http://www.hear.org> identifies most invasive species present in Hawaii. However, more needs to be done to ensure that good information is kept about all alien taxa present in the state, and distinguishing those for which there is some evidence of invasiveness from those which are apparently harmless, all the while following standardized methods to support state needs for practical invasive species management applications.

HISC approved \$160,000 to go to the Bishop Museum for the first year of a multi-year project to document all alien taxa in the state and the factors that contribute to invasiveness. More information is provided in the description of the budget approved by HISC. See HISC Budgetary Matters in this report.

MONEY SPENT ON INVASIVE SPECIES MANAGEMENT IN HAWAII

As shown in last year's report, 2006 spending on invasive species management in Hawaii was significant at about \$40.8 million for government-projects and up to \$153 million total spending on invasive species and pests; actual costs to our economy could be higher as few estimates of that take into account lost productivity and lost opportunity (e.g., access to markets for Hawaiian

products). See below in this report Funding Sources for Invasive Species Management.

ORGANIZATIONAL AND RESOURCE SHORTFALLS FOR INVASIVE SPECIES MANAGEMENT IN HAWAII

Resource needs to fill gaps in invasive species management capacity

The 2002 Legislative Reference Bureau study, *Filling the gaps in the fight against invasive species*, reported annual spending of approximately \$7 million on invasive species in Hawaii. The same study cited that in addition to current expenditures, an additional \$50 million is needed to deal with principal threats to Hawaii's economy, natural environment and people's health and lifestyle. Last year's legislative report identified about \$40.8 million of mainly state and federal funds spent in Hawaii on invasive species in 2006.

Hawaii is well known for its invasive species problem and in recent years scientists, resource managers and regulatory agencies have taken significant steps toward addressing the problem. Projects developed with HISC funding have greatly enhanced these efforts, and these lessons and actions are well regarded among experts in the field, both nationally and internationally. However, HISC funding and the matching funds that have been leveraged are not institutionalized, and there are many other functions that remain beyond the capacity of this state to protect Hawaii in a comprehensive and consistent manner.

The Resources Working Group was charged with identifying organizational and resource shortfalls in the area of invasive species management (Section 194-2, HRS). In 2008 a survey was carried out by staff to determine the principal organizational and resource shortfalls, including infrastructure, capitol improvements, staffing, research and other needs. This survey identified approximately \$145 million in unaddressed needs. The survey was thorough (although not exhaustive) and amounts are estimated in most cases. It is recognized that \$145 million is a large amount. This information-gathering exercise has produced a list of needs that may be prioritized so that funding particularly effective efforts, such as quarantine measures, would result in avoidance of the costs and impacts of pests that would arrive and spread without an adequate biosecurity system. In addition, partial progress can be made on multiple projects even with less funds.

In short, prioritization is needed. A balance is needed between the seriousness of the threat posed by invasive species and the adequacy of the response to mitigate that threat.

What is needed:

- Better laws and rules to support effective enforcement action to prevent the arrival, establishment and spread of invasive species;
- Comprehensive prevention and detection measures for both terrestrial and marine invaders not yet present in Hawaii;
- Better small mammal control to protect native birds;
- Better pig and ungulate control in high value native forest areas;
- Biocontrol for widespread pests;
- More control methods to address newly naturalizing pests already present in Hawaii; and,
- Public support.

| Resource shortfalls for invasive species management in Hawaii | Millions of dollars | |
|--|----------------------------|---------------------|
| | Annual | Set up costs |
| Modern Biosecurity System | \$4.0 | \$54.0 |
| Biocontrol | \$3.1 | \$10.0 |
| Restoration and Site Management to Protect Watersheds and Biodiversity | \$10.5 | \$10.4 |
| Rodent and Predator Control To Protect Native Biodiversity | \$4.0 | \$20.5 |
| Brown Treesnake | \$10.0 | |
| Invasive Species Committees | \$3.2 | |
| WNV | \$0.4 | \$3.0 |
| Some Agricultural Pest Control Needs | \$3.2 | |
| State of Hawaii Department of Transportation S.N.I.P.P. Statewide Noxious/Invasive Plant Program | \$6.0 | |
| Emergency Response Fund | | \$3.0 |
| | \$44.4 | \$100.9 |

Many conservation and invasive species efforts are soft funded. Financial security is lacking, job security is often poor and pay is lower than similarly technical or difficult jobs in the private sector. In the case of eradication programs, where the aim is to eradicate every last individual of an incipient population, success ultimately depends on early detection, fast response and continuous political and financial support to complete the job and follow-up efforts are needed to delimit and control all individuals (e.g., control of varroa mites and nettle caterpillars). Dealing with species like miconia and coqui frogs, which are widespread in some areas, requires research into more effective ways to control or even eradicate them. Funding for these initiatives must be institutionalized.

Inflation, rising fuel and other costs impact many programs as the cost of operating increases. For example, much of the invasive species work involves the use of helicopters to access remote sites, search for invasive species or control target organisms. This is an effective tool for managers, although costs may soon make these methods impossible. The State must find a way to fund these important programs, even in difficult economic times, or too much ground is lost along with the window of opportunity.

HISC has preferentially supported with its funds innovative projects that target gaps in capacity, rather than the simple augmentation of existing invasive species management capacity.

Modern Biosecurity System

Many invasive species that are not yet present in Hawaii pose a serious threat should they arrive and become established. Species, such as the red imported fire ant, brown treesnake, WNV, avian influenza, and many others, have the potential to seriously impact the economy, natural environment, and the health and lifestyle of Hawaii's people and visitors. The impact of red

imported fire ant alone was estimated to reach \$200 million annually within 10 years of introduction because of its impact on tourism, infrastructure and quality of life. Meanwhile, brown treesnake impacts could double. Investing in a modern biosecurity system would stop or postpone these costs for years. Money saved in costs avoided easily justifies a significant investment in such a program.

HISC has already contributed to this need by providing HDOA with funds for carrying out risk assessments at ports, where extra thorough inspections allowed HDOA to assess the risk posed by various pathways and commodities imported into Hawaii from mainland ports.

To conduct an adequate level of inspection on imported cargo, new facilities at sea and air ports are needed on all islands. Joint federal-state facilities are planned so that USDA and HDOA officers can carry out inspection, treatment and handling of cargo and prevent pest movement from domestic and foreign ports, and between islands. All such facilities need to be staffed and operated. Maui Airport recently had such a facility put in place. Conditions are much improved and inspections more effective. Some ports completely lack inspection buildings, and other ports are open-air and ill-lighted. Research about treatment methods and risk management are needed. Sophisticated manifest tracking databases are needed to identify high-risk cargo prior to inspection, and track effectiveness.

Estimated cost for inspection and treatment facilities in place on all islands over 6 years: **\$54 million**

Operating: **\$3-4 million annually**

Research: **\$1-3 million annually**

Rodent and predator control to protect native biodiversity

Offshore islets

Offshore uninhabited islets are excellent refuges from multitude of invasive species that plague the large islands, and these islets are the last refuge for many rare coastal species, including 22 species of seabirds. Eight threatened and endangered seabird species are currently found on the islets and 8 additional federal species of concern are present. The islets are home to large numbers of endemic (species found only in Hawaii) plants, insects, birds and marine creatures. Major threats to the success of these species include rats, cats, invasive insects and plants. Rats and cats are now known to be eradicable from offshore islands. After removal of rats from Mokolī'i islet (Chinaman's Hat) nesting wedge-tailed shearwater came back from 0 birds to over 200 in one season. Native plants and seeds also rebound, and even shoreline marine species become more abundant. Compared to the larger islands inhabited islands where control of non-native mammals is costly and managers must deal with continuous reinvasion, eradication of pests on offshore refuges is a cost investment with clear gains in the species that respond.

Rats (*Rattus exulans*) were present on Mokapu, an islet off of Molokai, until they were eradicated in February 2008 by the application of rodenticide pellets by helicopter. Rats are notorious for eating the fruit and seeds of plants as well as seabird eggs, causing declines in both. Biologists will continue to monitor the island to make sure all the rats are gone. Similar

successes can be repeated on other islets, and plans are in the works in 2008 to restore Lehua Island off of Niihau. HISC outreach staff helped to involve the community in that effort.

The use of helicopters and the logistical difficulties of getting to the islets can make each operation costly. Meanwhile, Kahoolawe could be one island in which eradications could be attempted on a larger scale, potentially creating the biggest refuge for native seabirds and plants in the Main Hawaiian Islands.

Predator-proof fences in high value biodiversity sites

On the main islands small predators, such as dogs, rats, mice, cats and mongoose, are known to kill ground-nesting birds and the small mammals with tree-climbing skills are able to prey on forest birds, chicks and eggs. Many endemic forest birds and invertebrates are preyed upon by cats, rodents, mongoose and mice. Ground-nesting seabirds are vulnerable at coastal and mountain sites. Many native plants have their flowers, fruit, seeds, stems and seedlings eaten by rodents, degrading the native forest and impacting resources for native birds. Predator control in such sites is usually done using rodenticides in bait-stations, or by trapping, usually in areas where endemic birds are known to exist. Such efforts are costly due to the effort necessary, and require multiple efforts each year due to re-invasion from surrounding areas. Similar techniques to those used in offshore islets would be able to show their return within a few years by demonstrating greater nesting success in key bird species, and less plant predation.

Predator proof fences are costly to build, but allow managers to undertake complete removal of predators from within the fenced area. These have been tested in New Zealand and elsewhere with good results. This is particularly useful for protecting birds from predator impacts. As native bird populations grow, such fenced areas could become eco-tourism sites in addition to providing safe sites for native biodiversity. One such fence is planned for Kaena Point on Oahu to protect albatross and petrel nesting sites that have been subject to continuous predation over many years. The current estimate of costs is for demonstration purposes and could allow the fencing of a 500 acre area divided between one or more sites. Predator-proof fences would also keep out feral ungulates, although fencing specifically for excluding species like pigs and sheep are covered in a separate section.

Offshore islets invasive species removal: **\$10 million**

Kahoolawe invasive species removal and restoration: **\$10.5 million**

Predator control: **\$4 million annually**

Proof-of-concept predator-proof fences: **\$2.4 million**

Restoration and site management to protect watersheds and biodiversity

Invasive species control in pristine and near pristine sites and watersheds requires “boots on the ground” to protect biodiversity values. Invasive plants negatively impact aquifer replenishment, and surface water, with native forest providing up to 30% more water than strawberry guava forests. Ungulates, including pigs, deer, sheep, antelope and goats, are managed in key areas to protect biodiversity, watershed values and to mitigate vectored diseases. Typically, ungulate management involves fencing off areas and removing all animals within the fence. New fencing is needed and the cost of maintaining currently installed fences is significant, with annual

damages by tree falls, wear and tear, and storms. New developments in remote sensing technology allow natural resource managers to identify, locate, map and monitor native plants, invasive plants, animal impacts and management efficacy. This remote sensing technology may cost only \$2-3 per acre but watershed management areas are in the thousands of acres. The ridge to reef restoration paradigm can protect both terrestrial and reef ecosystems, but it requires much more work to be carried out in the lower areas of the island, which typically receive less attention because they are more degraded by competing land uses and invasive species.

Field crews: **\$3.5 million annually**

Remote sensing techniques for natural resource management: **\$3.3 million**

Ungulate fencing **\$6.1 million** and control **\$1 million annually**

Ridge to reef restoration: **\$6 million annually**

Biocontrol

The USDA-FS and HDOA are the only two agencies with capacity in this area at present and, to a lesser extent, UH. The building of a new state biocontrol containment and testing facility is needed, as the two current facilities are inadequate to combat widespread species for which chemical and mechanical control is not cost effective. Biocontrol has high up-front costs since researchers must ascertain the biocontrol's specificity and safety via years of testing prior to being released. However, the control of target organisms is continuous once a biocontrol species is successfully established. Modern biocontrol is cost effective and environmentally safe, and it removes the need to use pesticides while reducing the impact of widespread invasive species.

New facility: **\$10 million**

Research/Operating costs: **\$3.1 million annually**

WNV

HISC has funded DOH to undertake early detection work for WNV for the last 5 years. WNV has yet to arrive in Hawaii, but it could arrive and it has the potential to infect people and devastate bird fauna. This year's efforts are reported elsewhere in this report, in relation to prevention efforts. Such work should ideally be funded separately so that HISC funds can be used to support innovation and fill key gaps in the effort to protect Hawaii from invasive species. However, a concerted effort to eradicate the disease will be needed wherever the disease might be detected. Due to the fact that we are an island archipelago, the disease could possibly be eradicated using aerial mosquito control operations such as those used to keep mosquito populations down near urban areas of southern mainland states where the disease is now prevalent. Two aspects need to be funded are: annual early detection efforts and an emergency fund in case the disease is detected. A number of other pests and diseases not yet in Hawaii could also warrant an emergency fund to respond to newly detected infestations.

WNV early detection: **\$350,000 annually**

WNV rapid response contingency fund: **\$3 million**

ISCs

ISCs focus on the objectives of early detection, containment and eradication of priority high risk invasive species for which these objectives are feasible. They are heavily linked with state and county agencies and these agencies are often committee participants (see above for information about their current programs). Due to limited resources their work is leveraged and HISC funds typically provide between 20% and 90% of their funding. Work is carried out using soft money sourced from a variety of state, federal and county agencies. ISCs provide the only early detection capability for new invasive plants—there are no agencies that are tasked with this work. In addition, many of ISCs provide the only trained crew that works consistently on major invasive pests, such as miconia.

The work mainly involves hard work in the field searching for and controlling between 10 and 25 main target species that have been prioritized and assessed for feasibility of success. Early detection crews search for new targets at the earliest stages of invasion to maximize the probability of eradication before species are well established. Baseyards are often shared with other natural resource managers and require upkeep or, in some cases, facilities are on loan from agencies. Field crews may have to travel for much of the day or camp out in sites remote from the main baseyard, often accessing sites by helicopter. On Maui and the Big Island some crews are needed to work in specific geographical areas. GIS experts track field work progress; training safety and vehicle operations are growing costs. Helicopter contracts are an expensive and necessary part of the work. As one species is eradicated or contained this may allow other lower priority species to become targets. Currently identified funding needs are based on the assumption that current levels of funding continue, a situation that could be changing in these tough economic times of budget restrictions.

Invasive Species Committee needs: **\$3.2 million annually**

Brown treesnake

As mentioned above, the shift of a military base from Okinawa to Guam has increased the risk of introducing brown treesnakes to Hawaii. Complete inspections are needed in Guam and Hawaii to ensure the brown treesnake is not accidentally introduced to Hawaii, and this again underscores the need for new joint inspection facilities at ports.

Brown treesnake interdiction in Hawaii: **\$10 million**

State of Hawaii DOT- S.N.I.P.P. (Statewide Noxious/Invasive Plant Program)

SNIPP is a statewide effort to maintain and control noxious/invasive plant species at a manageable level along Hawaii's state roads, protect conservation, scenic and native habitat areas and early detection of high priority invasive species. Roads act as vectors for many invasive species and some may have conservation, aesthetic and safety impacts.

Roadside invasive plant control: **\$6 million annually**

Some Agricultural Pest Control Needs

Staff from the Hawaii Agricultural Resource Center identified needs in the area of controlling key pests of agriculture, such as fruit flies, birds that prey on seed crops, fireweed in pastures and Napier grass in cane fields.

Agricultural pest control needs: **\$6.8 million annually**

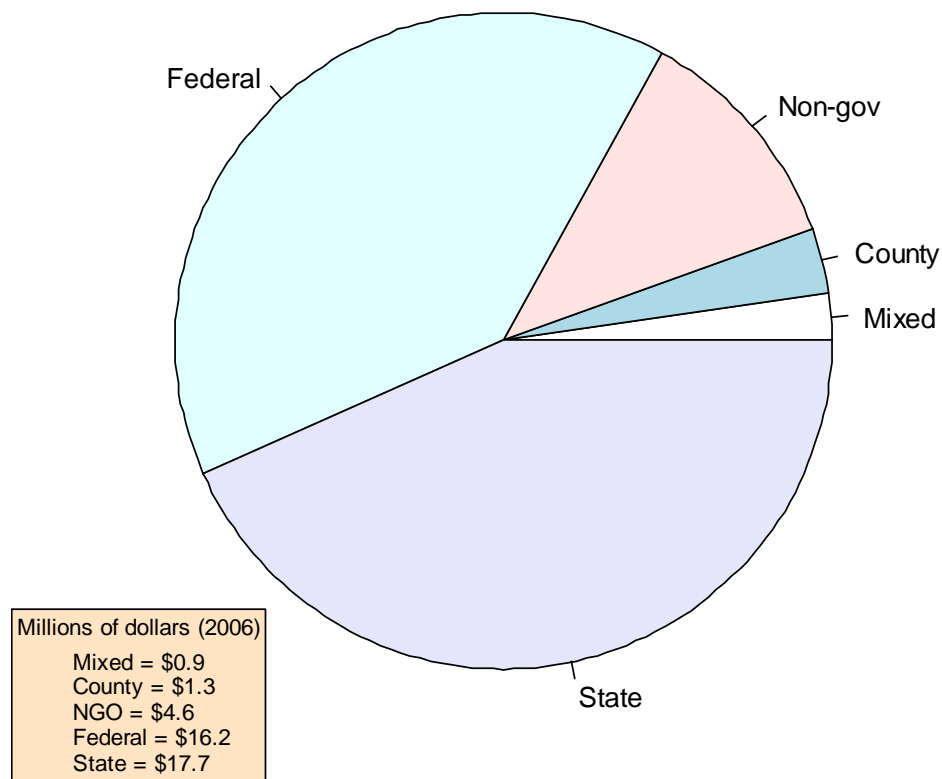
Emergency response fund

WNV, avian influenza, red imported fire ant, and brown treesnake, as well as any number of less famous invasive species, diseases or pests could warrant a full and rapid response in the event that they are detected in Hawaii. In the case of red imported fire ant and brown treesnake the costs to Hawaii, should those species establish, have been estimated in the hundreds of millions of dollars in direct and indirect costs.

Emergency response fund: **\$3 million**

FUNDING SOURCES FOR INVASIVE SPECIES MANAGEMENT IN HAWAII

There has not been a resurvey of spending by Hawaii agencies involved in invasive species since last year. Results of last year's survey are reported in detail in last year's legislative report. In that report spending on government-supported invasive species management projects in Hawaii were sourced from USDA, USFWS, DOD, National Park Service, HISC, DLNR and HDOA. Individually most projects relied on funds from both state and federal sources though county and non-governmental organizations contributed. Mixed funding sources means that the reporting agency often did not distinguish where funds were from but is generally state and federal sources. Little change in the relative sources of funding is likely since 2006.



ADVICE TO THE GOVERNOR/LEGISLATURE ABOUT INVASIVE SPECIES

In January 2006, HISC approved a resolution in support of the invasive species recommendations of the Governor's Economic Momentum Commission Report. HISC confirmed that the recommendations were in line with several of its goals and tasks as outlined in the HISC strategy and legal mandates. More is reported below under Invasive Species Fines, Penalties, and Regulations.

COUNTY INVOLVEMENT

HISC supported on the ground work and outreach by ISCs in all counties and has been working closely with counties to control coqui frogs and miconia to protect watersheds. There has been

increasing interest from counties to be involved in the management of invasive species.

REVIEW OF CONFLICTING AGENCY MANDATES

There have been no programmatic reviews of conflicting agency mandates during the last 12 months.

INVASIVE SPECIES FINES, PENALTIES, AND REGULATIONS

Each member agency or HISC working group has carried out reviews of laws and regulations on an ad-hoc basis. Although within the duties of the HISC, none of these bills was suggested by the HISC directly. Some bills, however, were testified upon by HISC members. Of the bills introduced, three related to biosecurity, four related to cargo and transportation issues, three related to taro and the apple snail, and two related to pig control.

Of note were the few bills that did pass, as well as a resolution.

House Bill (HB), House Concurrent Resolution (HCR)

HB 2517 (Now Act 40, SLH 2008), This bill allows HDOA to regulate or prohibit the sale of specific plants on the restricted list. This bill prohibits the sale of noxious weeds, provided that noxious weeds may be imported only for research by permit.

HB 2977 (Now Act 160, SLH 2008), This bill requires the appropriate state agencies to collaborate with the counties and communities to develop and implement a systematic approach to reduce and control coqui frog infestations on public lands that are near or adjacent to communities, and to report on this progress annually. Note: This HISC legislative report includes this annual report on coqui frogs.

HB 2843 (Now Act 3, SSLH, 2008), Expands the items subject to the inspection, quarantine, and eradication service fee (inspection fee) to include any freight (by air and sea) brought into the State. This bill requires the inspection fee to be assessed based on net weight of imported freight (50 cents per 1,000 pounds). It also designates the person paying the freight charges to a transportation company as the party responsible for paying the fee. Further, it clarifies that the transportation company is not liable for the fee in the event the party responsible for the fee fails to pay it. This bill amends Chapter 150A, HRS, which had contained a \$1 fee per 20 ft. container. This fee is supported by the invasive species recommendations made by the Governor's Economic Momentum Commission (EMC) Report of December 19, 2005. The EMC recommendations read as follows:

Another major threat to Hawaii's economy, natural environment, health and lifestyle is the continuous introduction of invasive weeds, animals, insects and diseases. The cost to control invasive species already in Hawaii, such as termites, fruit flies and Miconia, runs in the hundreds of millions of dollars annually. The cost of prevention of invasive species has been shown repeatedly to be exponentially less than the cost to control pests once established. The Hawaii Department of Agriculture (HDOA) carries the State's

responsibility for border inspections, yet is well below capacity to carry out these duties adequately.

*The Commission **recommends** a review of user fees from importers/shippers to ensure these fees are adequate to properly fund the needed prevention and quarantine programs. Additionally, we should revise state plant import regulations to include an “approved list” approach for new plant introductions.*

The HISC approved a resolution in support of the EMC’s invasive species recommendations in January of 2006.

The bill was passed by the Legislature, vetoed by the Governor, then a veto override passed both houses by a 2/3 majority. Although the bill went into effect August 1, 2008, the fee has not yet been fully implemented or collected by HDOA.

HCR 208, The Hawaii Legislature adopted a resolution supporting the actions of our U.S. congressional delegation to resolve the issues regarding federal preemption prohibiting state inspection of imported foreign plants, plant products, and other biological organisms (7 USC Sec. 7756).

Federal preemption prevents the State from implementing any stricter inspection or quarantine measures on imported foreign plants and their products. If the State wishes to raise additional restrictions on plant species known to be highly invasive in Hawaii, they have to pass through a laborious process to get approved by the U.S. Secretary of Agriculture on a species-by-species basis (7 USC Sec. 7756[b][2][B]).

Last year DLNR reported concerning two emergency rules implemented by HDOA. The status of these has changed somewhat:

- An interim emergency rule was proposed to HDOA to prevent the importation of plants or plant parts in the myrtle family from areas infected with ohia rust (*Puccinia psidii*). A new strain of this disease could decimate the canopy of remaining areas of native forest which are dominated by ohia lehua, with potentially serious knock-on effects for forested areas, rainfall patterns, water supply, erosion, flooding frequency and native biodiversity.

Preventing additional strains of ohia rust (*Puccinia psidii*) from entering the state remains a priority for HISC. HDOA’s emergency interim rule restricting import of potential host plant material of ohia rust from areas infested with the disease expired August 31, 2008. Inspectors are currently inspecting all shipments containing plant material in the Myrtaceae family entering Hawaii from areas known to be infested by the disease. Material showing rust symptoms or containing pests not present in Hawaii will be rejected. A permanent rule change is being pursued through a new subchapter in Chapter 70. A project funded by the HISC Research and Technology (*see Research and Technology Grants*) and the USDA Forest Service is assessing risk of additional strains entering Hawaii. Scientists at UH, USDA-FS, and in Brazil are collaborating to characterize extant strains in Brazil, Florida and California. These strains will then be tested on ohia seedlings to determine relative degree of pathogenicity on ohia and potential threat to Hawaii’s forests. Ohia seeds have been sent to Brazil where they will be raised

for inoculation tests and genetic analyses are ongoing. This information will be helpful in supporting regulations for the importation of Myrtaceae plant material to Hawaii.

- Last year HDOA passed an emergency rule to prevent the movement of bees and bee products inter-island or within islands to prevent the movement of the varroa mite which affects beehive health. This species was only known from Oahu but has since been detected on the Big Island.

The varroa mite, an external parasite of the honey bee, is worldwide in distribution with Australia the only large land mass still free of this pest. The mite was first detected in North America approximately 30 years ago. The mite feeds on the hemolymph of the bee, weakening the infested bee; the population in the mite increases in a hive and weakens the hive as well. Hawaii is no longer free of the mite, detected for the first time in April 2007 in several abandoned hives in Makiki on Oahu. A survey of Oahu showed the mite to be widely distributed on Oahu in the weeks that followed with no other positive finds of the mite elsewhere in the state. To prevent movement of the mite statewide, HDOA's State Plant Quarantine promulgated an emergency rule in August 2007 prohibiting the movement of live and dead honey bees, as well as used bee equipment between islands.

On August 22, 2008, a honey bee swarm collected in Hilo along Banyan Tree Drive, was found to be infested with the mite. An Incident Command System was immediately established to survey for the mite in feral and managed hives in the greater Hilo area to contain what appeared to be a new, localized infestation of the mite. To date, over 166,974 bees have been sampled and tested for the mite in the Hilo area. Of the numerous samples collected, only five samples have been positive for the mite, three feral hives and two swarms, all within a mile radius of the original find on Banyan Drive. A total of 173 swarm traps have been installed in Hilo, along with bait stations to attract foraging bees. An Emergency exemption was declared to allow use of microencapsulated chlorpyrifos insecticide to knock out feral hives that may be infested and serving as a reservoir source of the mite. A quarantine exemption use of the insecticide for bee control has been submitted to the U.S. Environmental Protection Agency for extended use of the toxicant for bee control in all port areas statewide and to knock out feral bees in new infested areas of the state as they are (or might be) found. A total of 90 feral hives have been destroyed to date (i.e., through October 1, 2008) in a control area extending five miles from the infested hives. Thirty six managed hives in the Hilo area have been tested and all were negative for the mite.

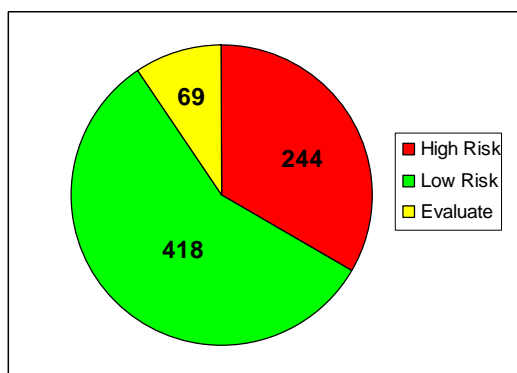
The containment, control and eradication program will continue in Hilo as long as the surveys and samples indicate the mite infestation is contained and within reach of eradication. At this time, the priority is the development of an effective attraction and kill combination with baits and chlorpyrifos to knock out possible reservoirs of the mite in feral hives.

WRA

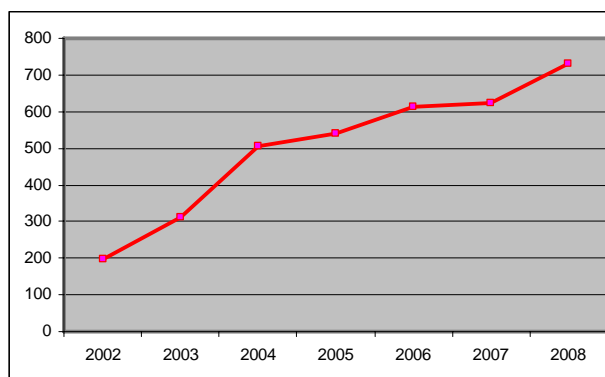
Two objectives of the HISC Strategy for 2008-2013 are to “develop a comprehensive approved planting list” to ensure that invasive species are not being planted in state projects or by any state contractors, e.g., screened by the WRA protocol” and to “develop collaborative industry guidelines and codes of conduct, which minimize or eliminate unintentional introductions.” In keeping with these objectives, a recommendation was adopted at the July 2008 HISC meeting

that state agencies conducting planting operations request HPWRA scores when available as one of the tools to assist in determining whether or not to plant a species.

In accordance with past and future priorities set forth in the HISC Strategic Plan continued effort needs to be put into WRA so that more of the 10,000 species known in Hawaii and the many other species that could be introduced from around the World can be assessed and documented. The current incarnation of the HPWRA Program started in April 2006, and incorporated completed assessments utilized to develop the screening protocols. As of September 2008, 731 assessments, assigned to categories of “High Risk,” “Low Risk” or “Evaluate,” have been completed and posted on the website at: <http://www.botany.hawaii.edu/faculty/daehler/wra/default2.htm>).



731 posted assessments by risk category.



Cumulative assessment total by year.

The following is a list of highlights and accomplishments from the period of September 2007 through September 2008:

INTERNATIONAL WEED RISK ASSESSMENT WORKSHOP, PERTH, AUSTRALIA

WRA Specialist Charles Chimera attended conference & workshop on invasive plant species in Perth, Australia September 11-24, 2007.

Chimera participated in reviewing and revising some of the criteria for screening plant species in conjunction with international experts from Australia, New Zealand, and elsewhere, who developed and are currently employing regional versions of the Weed Risk Assessment system.

WEED RISK ASSESSMENT REQUESTS BY AGENCY AND ORGANIZATION

Department of Tropical Plants and Soil Sciences, UH Manoa and CTAHR



S. sinuatus (Photo: Ken Beath).

WRA specialists are working with Dr. Andy Kauffman to identify a selection of viable ornamental trees and shrubs to replace ones currently on the invasive species list. WRA specialists are also working with Dr. Richard Criley and others to aid in identification of non-invasive alternatives to replace the dead and dying *Erythrina* trees across the islands. Two promising low risk alternatives have been identified, including *Erythrina abyssinica* and *Stenocarpus sinuatus*.

Maui County Planting Plan

WRA specialists have completed the list of 30+ screening requests used to make planting decisions by Maui County government.

ISCs

WRA Specialists have screened requests from Oahu (OISC), Kauai (KISC) and Maui (MISC) ISCs to aid in early detection and prioritization for control of potential invasive plants.

Early Detection and Rapid Response Team – Bishop Museum

HPWRA continues to be an integral part of plant species prioritizing efforts by the Early Detection team of Bishop Museum. One screening request included a grass seed packet being sold at a local retailer that was identified to contain at least nine high risk or known invasive species.

Voluntary Codes of Conduct for the Nursery Industry

Any agency or individual that signs the “Voluntary Codes of Conduct” pledges to use the HPWRA for making informed decisions before importing and undergoing large-scale propagation of plant species. As an incentive, the HPWRA Program gives priority to these agencies when screening species. The plant industry groups that have signed voluntary Codes are the Oahu Nursery Growers Association (ONGA), the Kauai Landscape Industry Council (KLIC), and the Maui Association of Landscape Professionals (MALP). Others, like Wal-Mart Garden Marts statewide have agreed to not sell certain invasive plants, and the Landscape Industry Council of Hawaii (LICH) endorses the Codes project. Signers of the Codes are the Hawaii Island Landscape Association, Harold L. Lyon Arboretum NTBG. Both Lyon and NTBG have agreed to have new plant introductions screened using the HPWRA, remove some incipient invasive plants from display, and help educate the public about the issue.

National Invasive Species Coordinator for the Republic of Palau

Other Pacific islands, in addition to Hawaii, continue to actively use the HPWRA Program to make plant importation, propagation and control decisions. *Hamelia patens*, *Calathea majestica*, *Pilea nummulariifolia*, *Costus woodsonii*, *Episcia cupreata* and *Bauhinia hookeri* were recently screened on behalf of the Government of Palau to aid management decisions as well as to forestall importation of any potentially invasive plants.

Federal Agencies

Assessments have been completed for federal government agencies including the USGS-Biological Resources Division (BRD), the USFWS and the USDA-FS. Of particular importance were assessments for *Agrostis stolonifera* and *Polypogon monspeliensis*, as requested by the USFWS. These assessments were intended to aid in decisions to stop the planting of an herbicide-resistant cultivar of *Agrostis* that has the potential to hybridize with other grass species. Collaboration has also been ongoing with USGS-BRD scientists to screen potential additions to the state's restricted plants list.

Watershed Partnerships

Several assessments have been completed for the Koolau Watershed Partnership on Oahu to aid in prioritization and management decisions for known and potentially invasive plant species. An important assessment of *Rauvolfia vomitoria* (poison devil-pepper) was also recently completed on behalf of the Kohala Watershed Partnership on the Island of Hawaii to raise concern for and awareness of this incipient and potentially devastating watershed invader.



R. vomitoria (Photo: Melora Purell).

Individual Plant Growers/Landscape Professionals

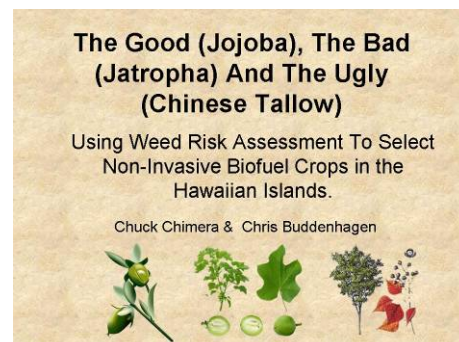
The HPWRA program is continuing to receive plant information and screening requests from plant growers and landscape professionals, including several requests from Maui Land & Pineapple Company, to assess new development planting lists for known or potentially invasive plant species.

BIOFUELS ASSESSMENTS

Rising energy prices and concerns about global warming have generated increasing interest in development of alternative fuel sources in the Hawaiian Islands. In particular, funding and research are currently being directed toward the evaluation of potential biofuel crops that could be used for the production of ethanol, biodiesel or burned directly as biomass. Legislation such as Act 240, the Alternate Fuel Standard, has established goals that 20% of the State's highway fuels should be derived from alternate fuels by 2020 and is further driving interest in biofuel development. Despite the positive connotations of the "bio" label, however, many biofuel crops possess characteristics of serious environmental weeds. Although several of the proposed biofuel crops are already present in Hawaii and some have been documented to be invasive in the

islands, others are not currently widespread or have not yet been imported. The WRA system has been utilized as an objective tool that can help predict which plants are likely to become problems by investigating their biology, ecology and history of invasiveness elsewhere. Using these protocols, 32 proposed biofuel species have been analyzed and ranked according to the weed risk they pose to the environment. The results indicate that over 60% of potential biofuel crops pose a high risk as invasive species. The risk of invasion will become even greater if these crops are widely planted, leading to an increase in propagule pressure. Following the assessments, recommendations have been made to minimize the invasion risk and to identify low-risk alternatives.

WRA Specialist Charles Chimera has attended meetings and given several presentations to inform the public and conservation agencies of the biofuel assessments and findings. These include a presentation entitled “The Risk of Invasive Plants as Biofuel Crops” to the Natural Area Reserves System (NARS) Commission in February 2008, a co-presentation with Chris Buddenhagen titled “Biofuels: Panacea or Pandora’s Box” at the Kauai Conservation Conference in April 2008 and a presentation entitled “The Good (Jojoba), The Bad (Jatropha) And The Ugly (Chinese Tallow): Using Weed Risk Assessment To Select Non-Invasive Biofuel Crops in the Hawaiian Islands” at the Hawaii Conservation Conference in July 2008.



Hawaii Conservation Conference

Ongoing dialogue with agricultural research scientists Michael Poteet of the Hawaii Agriculture Research Center, Richard Ogoshi of UH and Bill Steiner of the College of Agriculture, Forestry & Natural Resource Management at UH Hilo has also raised awareness and concerns of invasiveness in their evaluations of potential biofuel crops.

HPWRA OUTREACH



Maui News Article

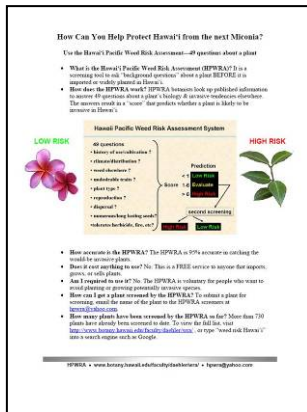
To promote awareness and encourage adoption of the HPWRA system, WRA Specialist Charles Chimera has been involved in several outreach activities with partner agencies, signatories of the Codes of Conduct and other interested parties. Over the past 12 months, Chimera has given presentations on the HPWRA to the National Tropical Botanical Garden and Kauai Landscape Industry Council on Kauai in April 2008 and to the Native Hawaiian Plant Society on the Island of Maui in June 2008. He has also attended and set up and displays on the Codes of Conduct and the HPWRA at the Maui County Fair in October 2007, the Arbor Day event at the Maui Nui Botanical Garden in November 2007, the Maui Community College Agriculture Resource Day in February 2008 and the Earth Day event at the Maui Nui Botanical Garden in April 2008. Chimera participated in a meeting and answered questions on the weed risk assessment and Codes of Conduct with the Maui

Association of Landscape Professionals in January 2008 and attended the annual conference of the Landscape Industry Council of Hawaii in May 2008.

Articles on the HPWRA system were also written and published in the *Maui News* on June 8, 2008 and more recently in the fall 2008 Newsletter of the MISC.

A prototype one-page flier was recently produced to succinctly explain the HPWRA system and encourage its adoption by both professionals in the industry, as well as plant enthusiasts and other members of the general public. It is anticipated that some version of this flier will be passed out at future public events such as those previously mentioned, as well as being available for download from the HPWRA website.

HPWRA Flier



In the past, screening requests were sent directly to the individual e-mail

address of the WRA specialist. Unfortunately, this has resulted in some miscommunications and unanswered requests following changes to personnel. To remedy this problem, a dedicated e-mail address for weed risk assessment requests, hpwra@yahoo.com, was created within the past year that will be transferable from current to any future WRA specialists.

CURRENT WORKLOAD

The list of species submitted to be screened at this point is well over 400, due in large part to an informal request to assess as many of the 450 species as possible in Ewald Weber's book *Invasive Plant Species of the World: A*

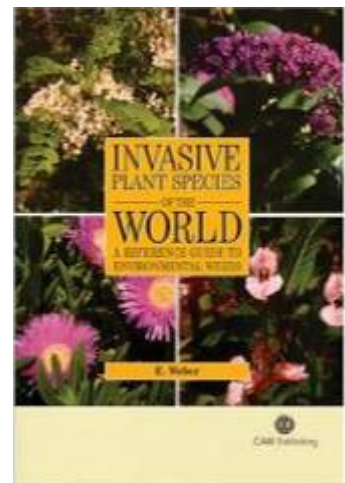
Reference Guide to Environmental Weeds. The purpose of these assessments, in particular, is to increase the number of potential candidate species to be added to a prohibited plant list for the state. In addition, known invasive plants from other tropical regions in the world, not yet present or widespread in the Hawaiian Islands, will be given high priority for screening and addition to the prohibited list.

In addition, most of the individuals, agencies and programs previously mentioned submit plant species for screening on a regular basis.

FUTURE NEEDS

The HPWRA website continues to be maintained through Dr. Daehler's webpage in the UH Department of Botany. As such, the website is not very accessible or user-friendly to the general public, and assessments are not always posted in a timely manner. In order to more efficiently serve the general plant industry and conservation efforts in Hawaii and other Pacific islands, the HPWRA program has registered two domain names on the Internet, hpwra.com and hpwra.org and has future plans to incorporate or link to photos of the screened plants.

Currently, all HPWRA data exists as separate excel sheets. Incorporating all the data into a searchable database, such as "Access," would help general trends in the data and would be a simple first step toward assessing how HPWRA could better serve the conservation and nursery industries. A contract to design this HPWRA database and convert existing spreadsheet-based



data to the new format was awarded in summer 2008 and work has recently begun on its development.

HISC BUDGETARY MATTERS

Approved 2008-2009 FY Budget for HISC

The invasive species budget initiative calls for the expenditure of \$3 million in state special funds and \$1 million in general funds for State FY09 to provide support for both the operations of HISC and its cooperating partners to develop and implement a partnership of federal, state, county, and private entities for a comprehensive state-wide invasive species prevention, detection and control program. State dollars will be matched (1:1) voluntarily by non-state dollars or equivalent in-kind services making this an overall effort of at least \$8 million. Redistributing the percentages allocated to each budget area, as compared to the budget proposed in the Interim State of Hawaii Strategic Plan for Invasive Species Prevention, Control, Research and Public Outreach, builds on the lessons learned in the first three years of the HISC budget initiative. This also acknowledges the successful HDOA Biosecurity initiative and its service fee establishment, as well as coqui frog control funding.

Although this budget request is under DLNR,, it includes and involves programs and projects through multiple departments, the four counties and federal and private partners. The funding will not replace state agency, private, or federal funding, but will support the development of innovative approaches that address gaps in capacity and build on existing cooperative programs. The goal of this funding is to build successful new programs which better protect Hawaii from invasive species and encourage the incorporation of these programs into agency operations.

A more transparent process for balancing the budget between working groups was implemented. Projects were proposed in public meetings of the working groups. The Resources Working Group then met with working group chairs in a public meeting format to determine how funds were to be allocated to projects proposed by each of the HISC working groups. Working groups put together their proposals for funds that included high and low estimates to address their needs. Working group chairs and participants were fully aware that their proposals had to be viewed in the context of a \$4 million budget. The working groups put forward proposals with merit but their requested funds exceeded available funds by between \$380,000 and \$1.1 million. Funding restrictions have affected HISC and indeed all participating agencies and collaborators are anticipating a need for downsizing their programs due to budget restrictions on state and federal budgets. If Act 3, SSLH, 2008, is implemented successfully the funds it generates could be available for additional and improved prevention efforts at ports and airports in Hawaii. A number of high profile and costly pests, plus a multitude of more minor pests have yet to establish in Hawaii and prevention is considered a cost-effective strategy to avoid the costs associated with their establishment in Hawaii (e.g., brown treesnake, red imported fire ant, and WNV).

A detailed budget request is attached. The overall goals of the Administration's budget request for HISC are to:

- Advise the Governor and Legislature on budgetary and other issues regarding invasive species.
- Coordinate invasive species management and control programs for county, state, federal and private sector entities by developing a structure for cooperators to work together to share resources and responsibilities to address specific invasive species issues.
- Educate the public and private sector about invasive species to positively affect perception, action and funding for control and prevention.
- Review risks of pest/invasive species entry into the state; and implement measures and improve Hawaii's capacity to prevent the entry of new pests/invasive species with shared resources and shared responsibilities of all agencies.
- Review priorities for the control of pests already present or recently arrived in the state; and implement cost-effective eradication and control programs against incipient and established pests with shared resources and shared responsibilities among private, not-for-profit, county, state and federal agencies.
- Encourage researchers to address the problems created by invasive species and the development and implementation of new technology to prevent or control the establishment of invasive species. In particular, to develop effective, science-based management approaches to control invasive species; effectively communicate and apply the results of research to the field; and promote interagency collaboration and stimulate new partnerships.

The state funding is broken into four integrated components, as well as a separate administrative budget:

- 1) Building up Prevention capabilities \$573,400 (14% of total funding). Projects include;
 - a. \$307,300 to DOH – Develop the capacity of the Department to prevent the establishment of WNV by providing supplies and support for the State Laboratory, Vector Control Branch and Environmental Education to promote awareness and public participation.
 - b. \$97,700 to DLNR – To sustain two technicians to continue the screening of plants grown and used commercially in Hawaii via the locally developed WRA. So far, the Maui Association of Landscape Professionals, the Landscape Industry Council of Hawaii, Kauai Landscape Industry Council, the Oahu Nursery Growers Association and a number of individual companies have agreed to adopt the voluntary Codes of Contact that include screening plants using the WRA and promoting non-invasive alternatives. HISC passed a resolution that state agencies conducting planting operations should request HPWRA scores, when available, as one of the tools to assist decision makers in determining whether to plant a particular species. For species that have scored as potentially invasive in Hawaii, this information should underscore the need for containment plans or remediation efforts if they become necessary. HPWRA and outreach staff should work with state and county agencies to identify the agencies with planting guidelines, seek to

gain their support of this recommendation and inform them of the weed risk assessment services we provide.

- c. \$84,200 to DAR – To support prevention projects to minimize the introduction of alien aquatic organisms in Hawaii from hull fouling and ballast water. This would include funds for regulation changes, compliance measures, early detection efforts, specialized equipment and marine invertebrate taxonomic expertise.
- d. \$54,200 is for an apiarist to be based in HDOA. This position will help in efforts to facilitate effective management and regulation of honeybees and their pests, especially the varroa mite, a pest that has had a major impact on honeybee colonies on Oahu. Members of the lucrative queen and bee-rearing industry on the Big Island are particularly concerned about the recent arrival of this pest in Hilo and its potential to devastate their industry.
- e. \$30,000 for a Hawaii Ant Projects Coordinator to work for HDOA to bring about more effective protection of Hawaii's environment from harmful alien ants, with special emphasis on prevention and control of the little fire ant (present on the Big Island) and the red imported fire ant (still absent from Hawaii). In early 2007 the "Hawaii Invasive Ant/Red Imported Fire Ant Prevention Plan" was updated. To this end, the interagency Hawaii Ant Group was resurrected to get input and agreement on potential plan revisions; some funds from FY2008 will also be used to hire someone for a year. The plan identifies further actions needed to address this threat. The position was recently advertised and should be filled shortly.

3) Developing Response and Control programs \$2,092,700 (52% of total funding) to conduct invasive species detection, response and control actions on the ground and in the water. Projects include:

- a. \$1,616,300 – Interagency invasive species committees guide on-island field crews in each of the counties implementing early detection, rapid response, eradication or containment programs for incipient invasive species, working on public and private lands. The four invasive species committees target more than 30 species of plants and animals in areas covering tens of thousands of acres; some of their more high profile targets include miconia, coqui frogs, pampas grass and ants.
- b. \$411,400 is for DAR – This statewide program addresses marine and freshwater invasive species, through local control, early detection and rapid response efforts. Control of algae on reefs using the Supersucker, algae suppression strategies, habitat restoration of wetlands, outreach and control of incipient invasive invertebrates are key focus areas.
- c. \$65,000 – Environmental Assessment (EA) Coordinator for biocontrol projects will support the EA process for biocontrol programs implemented by the USDA and HDOA using up-to-date scientific methods. The coordinator will identify stakeholders, conduct outreach, collect input, write draft assessments, and address regulatory issues as appropriate.

4) Research and Applied Technology funding \$500,000 (13% of total funding) for new research and technology projects.

- d. \$330,000 – Projects addressing invasive species will be solicited via a public notice of request for proposals, to encourage competition among providers to obtain the most advantageous proposal(s) that the market can support. Last year, 15 high quality research and technology projects were funded at a cost of \$782,156; these were selected from a pool of 48 proposals that addressed coqui frog and general invasive species issues with funding requests totaling approximately \$2.8 million.
- e. \$10,000 – An international workshop seeks to develop collaborative projects with other countries in the South Pacific to do research on biocontrol agents for shared pests, with the desired end point of obtaining biocontrol agents for priority pests at reduced cost. Funds will allow USDA and HDOA staff to participate.
- f. \$160,000 – Bishop Museum’s Hawaiian Biological Survey program will provide up-to-the-minute information about the status of alien and invasive plant and animal species present in Hawaii, as well as identification services for introduced species. There are already 5,314 alien species documented as established in the wild, many thousands more are known to occur. This supports one of the HISC’s legal mandates “For those species that do arrive in Hawaii, identify and record all introduced and invasive species present in the State.” Extra attention will be given to incipient species, and the information is expected to support management efforts and regulatory and policy issues that require agencies to know which species are present in Hawaii.

5) Public Outreach Program \$312,200 (8% of total funding) in cooperation with the public and private sector for visitors and residents to increase voluntary compliance of quarantine laws, avoid accidental introductions of invasive species, and establish an effective pest hotline reporting system that delivers timely information to managers on the ground. Funds fully cover specialist outreach staff on Kauai, the Big Island, and a statewide role base on Oahu. In addition, half the salary is included for Oahu and Maui outreach positions. Increased emphasis on statewide messages identified in the recently updated HISC strategic plan are expected to provide better uptake in the community. Specific collaborative efforts with appropriate agencies, groups and organizations are expected to increase the impact of the outreach team. Effectiveness of the outreach effort is measured through a third party survey.

6) HISC Support functions \$521,700 (13% of total funding) includes two HISC support positions, overhead, a fee, and mandated 8% budget restrictions on general funds. This Central Service fee (7%) is included in the budget this year to fairly allocate the cost of these fees across all the programs receiving funding from the Natural Area Reserve Fund (NARF). Central Service fees are estimated to total up to \$900,000 for NARF overall and \$210,000 is the proportionate amount that should be assessed on the \$3,000,000 being allocated to the HISC program from NARF. The DOFAW overhead (\$96,700) is calculated to be 3% for funds that are administered through DOFAW – some funds, such as the Central Service fee and funds transferred through journal voucher to member agencies, are not subject to the fee. HISC support positions include a half-time Grant and Budget Manager to contract for research and technology application services and other projects, such as community outreach grants. The second HISC support position is a HISC Coordinator who will provide opportunities for more effective communication between members and meeting support.

| | |
|----------------------|-----------|
| Central Services Fee | \$210,000 |
| Staff and Support | \$135,000 |
| DOFAW overhead | \$96,700 |
| Budget restrictions | \$80,000 |

This budget request has been aligned with both the Hawaii Invasive Species Council Strategic Plan and the HISC working group structures to assure not only compatibility with existing efforts but also accountability with specific measures of effectiveness. Lead HISC members will administer specific program components and HISC working groups will assure funding specifications, address priority statewide issues and fit into HISC member and cooperating partner operational programs.

On September 3, 2008, HISC approved the proposed FY08-09 budget allocation as presented above and summarized below to implement the State of Hawaii's Strategy for Invasive Species Prevention, Control, Research, and Public Outreach.

Approved budget requests and recommended funding for financial year 2009:

| PREVENTION | Requested | | Funded |
|--|--------------------|--------------------|--------------------|
| | High | Low | |
| Ant Prevention and Control Techniques | \$60,000 | \$50,000 | \$30,000 |
| Pathogen Detection and ID | \$49,000 | \$29,000 | \$0 |
| Apiarist for Varroa Mite Work | \$90,000 | \$65,000 | \$54,200 |
| Ballast Water and Hull Fouling Program | \$95,000 | \$95,000 | \$84,200 |
| Weed Risk Assessment | \$122,440 | \$108,570 | \$97,700 |
| WNV Detection and Suppression | \$378,104 | \$318,104 | \$307,300 |
| | \$794,544 | \$665,674 | \$573,400 |
| RESPONSE AND CONTROL | | | |
| BIISC | \$576,000 | \$408,100 | \$397,300 |
| MISC | \$520,000 | \$430,680 | \$430,700 |
| OISC | \$499,631 | \$424,000 | \$413,200 |
| KISC | \$490,426 | \$385,999 | \$375,100 |
| AIS | \$524,441 | \$422,283 | \$411,400 |
| EA Coordinator Biocontrol | \$90,000 | \$65,000 | \$65,000 |
| | \$2,700,498 | \$2,136,062 | \$2,092,700 |
| RESEARCH AND TECHNOLOGY | | | |
| RFP | \$424,000 | \$534,000 | \$330,000 |
| Biocontrol Capacity Building | \$20,000 | \$10,000 | \$10,000 |
| Alien Species Database | \$256,000 | \$156,000 | \$160,000 |
| OUTREACH | | | |
| Staff | \$210,000 | \$210,000 | \$210,000 |
| Materials/Services/PSAs | \$109,229 | \$109,229 | \$102,200 |
| RFPs | \$50,000 | \$25,000 | \$0 |
| Americorp Stipends | \$13,000 | \$0 | \$0 |
| | \$382,229 | \$344,229 | \$312,200 |
| HISC SUPPORT | | | |
| DOFAW Overhead (3%) | \$109,500 | \$109,500 | \$96,700 |
| Central Services Fee (7% of 3 M) | \$210,000 | \$210,000 | \$210,000 |
| Support Staff | \$135,000 | \$135,000 | \$135,000 |
| Budget restriction 8% | \$80,000 | \$80,000 | \$80,000 |
| | \$534,500 | \$534,500 | \$521,700 |
| | \$5,111,771 | \$4,380,465 | \$4,000,000 |
| TOTAL | \$700,000 | \$700,000 | \$500,000 |

Distribution of HISC funds fiscal years 2005-2009

| <i>Fiscal Years</i> | <i>2005</i> | | <i>2006</i> | | <i>2007</i> | | <i>2008</i> | | <i>2009</i> | |
|---|--------------------|----------------|--------------------|----------------|--------------------|----------------|--------------------|----------------|--------------------|----------------|
| Working Groups | Allocated | % funds | Allocated | % funds | Allocated | % funds | Allocated | % funds | Allocated | % funds |
| Prevention Subtotal | \$1,340,000 | 34% | \$1,516,535 | 38% | \$410,000 | 21% | \$736,400 | 18% | \$573,400 | 14% |
| DOA | \$943,000 | | \$755,000 | | \$0 | | \$0 | | \$84,200 | |
| DOH | \$201,000 | | \$455,135 | | \$350,000 | | \$375,000 | | \$307,300 | |
| USDA/APHIS/WS | \$110,000 | | \$186,000 | | \$0 | | \$0 | | \$0 | |
| (DLNR) | \$86,000 | | \$120,400 | | \$60,000 | | \$331,400 | | \$181,900 | |
| Pacific Island Learning Network | \$0 | | \$0 | | \$0 | | \$30,000 | | \$0 | |
| Established Pests Subtotal | \$1,700,000 | 43% | \$1,560,000 | 39% | \$1,115,000 | 56% | \$1,754,500 | 44% | \$2,092,700 | 52% |
| Aquatic Invasives (DLNR) | \$300,000 | | \$300,000 | | \$315,000 | | \$395,000 | | \$411,400 | |
| DOA | \$0 | | \$0 | | \$0 | | \$0 | | \$65,000 | |
| Invasive Species Committees | \$1,400,000 | | \$1,260,000 | | \$800,000 | | \$1,359,500 | | \$1,616,300 | |
| Research & Technology Subtotal | \$600,000 | 15% | \$600,000 | 15% | \$0 | 0% | \$700,000 | 18% | \$500,000 | 13% |
| Research & Tech. Grants | \$600,000 | | \$600,000 | | \$0 | | \$700,000 | | \$330,000 | |
| Bishop Museum | \$0 | | \$0 | | \$0 | | \$0 | | \$160,000 | |
| USDA/DOA | \$0 | | \$0 | | \$0 | | \$0 | | \$10,000 | |
| Public Outreach Subtotal | \$260,000 | 7% | \$248,465 | 6% | \$230,000 | 12% | \$312,000 | 8% | \$312,200 | 8% |
| Staff & Admin. (DLNR) | \$102,000 | | \$135,465 | | \$230,000 | | \$262,000 | | \$210,000 | |
| Outreach Projects (DLNR) | \$158,000 | | \$113,000 | | \$0 | | \$50,000 | | \$102,200 | |
| Administration, Restrictions, Central Services Fee | \$100,000 | 3% | \$75,000 | 2% | \$245,000 | 12% | \$497,100 | 12% | \$521,700 | 13% |
| TOTAL | \$4,000,000 | 100% | \$4,000,000 | 100% | \$2,000,000 | 100% | \$4,000,000 | 100% | \$4,000,000 | |

APPENDIX 1 DETAILS OF PUBLIC OUTREACH EFFORTS RELATED TO INVASIVE SPECIES

Number of education materials produced. Materials range from refrigerator magnets, key rings, and pens to posters, brochures, displays and printed and PDF newsletters, as well as a statewide HTML email newsletter. **Logged education material produced total 66.**

KISC

- Native Species Bookmarks (250), Calendars (300), T-shirts (250), and Note Cards (300) for Kahu Aina Educational Program
- “Plant Native, Don’t Plant Invasive” 36x24-inch Posters (1 for KISC, 1 for Firewise, 12 for Department of Education) and 75 card size given away at events and presentations
- “Don’t Dump a Pet/Pest” fishbowl display with Habitattitude, alien algae, and pet amnesty messages in cooperation with Division of Aquatic Resources
- “Don’t Track Seeds-Scrub your Boots” posters (1 at Moalepe Trailhead, 5 more for library, fair, and other displays)
- Australian Tree Fern ID Flier given to landowners
- “Keep Pets Contained,” displayed and given to landowners in cooperation with Division of Forestry & Wildlife
- Coqui Frog Key chains (1,500) soon to be purchased by OISC to distribute to nurseries, hotels, and other target audiences
- 643-PEST Key chains (1,000) given away at events and presentations, especially Early Detection Workshops
- 643-PEST Pens (1,000) given away at events and presentations, especially Early Detection Workshops
- “Wheel of Invasive Species Misfortune,” built by KISC and featured at events with games focused on target species trivia
- Protect Lehua Island Magnets (500), given out at events and presentations to promote invasive species control on Lehua
- “Lehua Will Thrive Again” flier in English & Hawaiian, given to Niihau schools, public meetings, sent out online, and distributed at events and presentations
- Native & Invasive Species Memory Game (4 sets) used as educational tool during school visits and student presentations
- “643-PEST-Save Hawaii with One Call” cards (150) given out at events and presentations
- Miconia bookmarks (75) given out at events and presentations
- “Protect the Forest from Your Own Backyard,” flier displayed at events
- “Protect Paradise-Snakes Don’t Belong in Hawaii,” flier displayed at events
- Weekly Weed of the Week flier and article posted online and distributed at events and presentations
- Agricultural Inspector Game to be played at events like Farm Fair and Agricultural Awareness Day

OISC

- Pampas grass brochure
- OED brochure
- Kudzu (*Pueraria montana*) flyer
- Feathertop flyer
- Fountain grass (*Pennisetum villosum*) flyer
- Biodegradable pens
- Added new species to educational display
- Keychains with coqui frog call
- Redesigned and updated all species flyers

BIISC

- “What’s in Your Backyard?” brochure - 1,500 copies
- “Native Plant” brochure - 500 for specific event (BIAN plant sale event)
- “Pampas grass” brochure - 700 for specific events (4 events total)
- *Kiai Hawaii: Guarding the Homeland*, BIISC Newsletter - Produced two newsletters during this reporting period, 500 each
- Invasive species coloring Books - 1,500 copies
- Large “Wanted” posters for fair event, 7 total
- Target species identification cards (52 total) - 6 sets completed

HISC

HISC eNews is an email marketing software account contracted in March 2007 to communicate professional HTML email educational material to a permission-based audience list. Since November 2007, the following monthly topics have been covered:

- “Developing a Habitattitude,” 11/14/07.
- “Trimming Invasive Species” (Xmas Trees/Yellowjackets), 12/13/07.
- “Breaking up Snowflake Coral,” 1/30/08.
- “Proposing Plant Policies,” 3/04/08.
- “Controlling the Rat,” 4/01/08.
- “Protecting Hawaii,” 5/12/08.
- “Preventing Pest Introductions,” 6/30/08
- “Slowing Down Strawberry Guava,” 7/16/08.
- “Applying a Conservation Tool,” 8/30/08.
- “Corralling Cats,” 9/30/08.

Position assists ISCs and statewide program with educational material layout and design and reporting documents, such as: *Kiai Hawaii: Guarding the Homeland*, BIISC newsletter, Honolulu Zoo invasive species signage, Legislative Report/Summary, and Strategic Plan/Summary.

- AG DAY poster
- Hawaii Conservation Conference poster
- ISC brochure
- RIFA brochure

AIS

- Reef Check Species Cards for distribution at training classes
- “Good Pet Choice” brochure
- Habitattitude brochure

Number of people reached through talks and displays. Various public events provide opportunities for engaging the public on invasive species issues. **Logged estimates of people reached through talks and displays total 31,258.**

CGAPS

Talks: 14 talks, 455 people. Events include the Department of Defense Pesticide Applicator course participants, Rotary Club of Honolulu, Landscape Industry Association of Hawaii conference, Maui Association of Landscape Professionals meeting, Hawaii Nursery Growers Association conference, University of Hawaii and Hawaii Pacific University classes.

Radio or television media interviews: Codes of Conduct on Hawaii Public Radio, and the Office of Hawaiian Affairs radio program.

Displays: 6 events, 1,092 estimated visitors. Events included the International Year of the Reef at the Legislature, Earth Day at the Zoo, Hawaii Science Teachers Association conference, Landscape Industry of Hawaii conference, etc.

- People reached: 1,547

KISC

Talks: 496 Presentations to landowners, KLIC, schools, volunteer groups, Rotary Clubs, and lecture series.

Displays: 4,665 events include Kauai Farm Fair, Garden Fair, Kapaa Family Festival, Princeville Library Display, He Puko a Kani Aina, and Arbor Day)

- People reached: 5,161

OISC

- People reached: 3,924

MISC

MISC participated in nearly all of the major community events on Maui, including Maui County Fair, Arbor Day Lawn and Garden Fair, East Maui Taro Festival, Haiku Hoolaulea, and Keanae Hoolaulea.

Talks & Displays focused on specific MISC and statewide target species and outreach messages. Public relations materials such as the MISC newsletter, *Kiai Moku o Maui Nui*, pens, magnets, and rulers were distributed at these events reached.

- People reached: 3,217

BIISC

8 “What’s in Your Backyard?” presentations attended by a total of 62

BIAN plant display at least 500

Hawaii County Fair events at least 2,000

Talk at the Imiloa Center - 150

Earth Day at the UHH - 10,000

Earth Day at Waikoloa - 500

Amy Greenwell event - 100

Coral Reef Awareness Earth Day event in Keauhou - 500

Waimea Earth Day event - 150

Pahoa School presentation - 30

Kamehameha School presentation (3 classes) - 90

Forest team presentations (2 classes) - 60

Waimea senior center presentation on coqui - 45

Pahoa Fair event - 250

- People reached: 14,302

HISC

Earth Day at the Zoo, April 26, 2008

Agriculture Day, poster, State Capitol, March 27, 2008

Hawaii Conservation Conference, poster, July 29-31, 2008

- People reached: 300

AIS

“Illegal and Unwanted Pet Amnesty Day” & “Habitattitude–don’t dump your aquarium pets or plants” displays, 2,000

Boater education: Hull Fouling/Ballast Water, 150

Earth Day Oahu Waikiki Aquarium, April 2008, 150

Earth Day, Big Island, April 2008, 150

Earth Day Molokai, 50

Ocean Day, University of Hawaii-Hilo Pacific Aquaculture and Coastal Resources Center, 300.

- People reached: 2,800

Number of invasive species educational programs and community events implemented by staff. Logged number of educational programs and events totals 58.

KISC

- “Garden Ghoul Bash” Halloween-oriented educational activities and “Aina Trick or Treat,” a game about native and invasive species at the National Tropical Botanical Gardens, October 27, 2008.
- Kauai Arbor Day Committee Featured educational displays on invasive species and “Invasive Species Bounty,” where people can hand in a high target weed from their garden in exchange for an extra native plant. November 3, 2007 & November 8, 2008.

- Kauai Conservation Conference, April 11 & 12, 2008.
- Lehua curriculum for Ke Kula Niihau o Kekaha outreach efforts in cooperation with USFWS and DOFAW implemented for the rat eradication project. School projects will also be in partnership with the National Tropical Botanical Garden, 2008-2009 school year.
- Kahu Aina Arts & Education Program hands-on service projects and painting, May 2007-ongoing. Co-implemented with the Garden Island Arts Council.
- E Hoopomaikai ia na Manu A o October 2007 & 2008, co-implemented with DOFAW to give school presentations.

OISC

- Nutcracker Suite at Foster Botanical Gardens 12/1/2007
- World Wetlands Day 2/2/2008
- Adobe InDesign CS3 Level 1 2/15/2008
- Mad About Science Fair - Bishop Museum 4/5/2008
- Public Citizen presentation - Punahou School 4/8/2008
- Hawaii Golf Course Superintendents Association 4/9/2008
- UH Manoa Earth Day 4/18/2008
- CTAHR Invasive Pest Class 4/23/2008
- CTAHR Earth Day 4/24/2008
- Punahou Sustainability Day 4/25/2008
- Zoo Earth Day 4/26/2008
- AG Day 3/27/2008
- Keiki WaterFest 5/14/2008
- LICH Conference 5/28/2008
- Lyon Arbor Plant Sale 6/21/2008
- DoCARE presentation 7/9/2008
- Guided tour for Punahou Students 8/17/2008
- HI State Farm Fair 7/26/2008
- HI Healing Garden Festival 8/23/2008

MISC

- Hoike o Haleakala curriculum through classroom visits and workshops in partnership with the Hawaii Department of Education's Professional Development program. One 3-day workshop was held in February with 14 teachers attending. Six teachers completed portfolios indicating that a minimum of 36 lessons were taught using the Hoike o Haleakala curriculum.
- Early Detection Workshops: USGS-PBIN and participants are given an Early Detection Field Guide (the printing of which was funded by HISC).
- Award/Certification Programs: A coqui-free nursery certification project, partially funded by HISC, allows certified businesses to market themselves as coqui-free. Surveys were conducted at each participating business. Marketing materials were designed and produced. The program will be officially launched once a coqui-free web site is established.

- Awarded the 5th Annual Malama I Ka Aina award, in association with the Maui Association of Landscape Professionals and the County of Maui, to the Friends of D.T. Fleming Arboretum. The award recognizes a landscape professional or organization working to protect Maui County from invasive species.

BIISC

- 8 technical training events on treating coqui
- 8 “What’s in Your Backyard?” programs
- 8 fair events

AIS

- “Illegal and Unwanted Pet Amnesty Day” at the Zoo, Oahu, November 2008
- Habitattitude
- Boater Education
- Earth Day
- Ocean Day

APPENDIX 2 CHAPTER 194 HRS INVASIVE SPECIES COUNCIL

This year HRS 194-2 (a) (4) was modified (see underlined text) by HB2977 that requires appropriate state agencies to collaborate with the counties and communities to develop and implement a systematic approach to reduce and control coqui frog infestations on public lands that are near or adjacent to communities, and to report on this progress annually.

Section

194-1 Definitions

194-2 Establishment of council; duties

194-3 Lead agencies; accountability

194-4 Relation of chapter to other laws

194-5 Entry; private property

194-6 Entry; public property

194-7 Rules

Cross References

Coqui frog; designation as pest, see §141-3.

Landowners liability for access to control invasive species, see chapter 520A.

Noxious weed control, see chapter 152.

Plant, animal, and microorganism, etc., imports, see chapter 150A.

[§194-1 Definitions.] As used in this [chapter], unless the context requires otherwise:

“Council” means the [invasive species council].

“Department” means any entity that is a member of the [invasive species council] established under section [194-2(a)]. [L 2003, c 85, §2; am L 2004, c 10, §16; am L 2006, c 109, §2].

[§194-2 Establishment of council; duties.] (a) There is established the invasive species council for the special purpose of providing policy level direction, coordination, and planning among state departments, federal agencies, and international and local initiatives for the control and eradication of harmful invasive species infestations throughout the state and for preventing the introduction of other invasive species that may be potentially harmful. The Council shall:

- (1) Maintain a broad overview of the invasive species problem in the state;
- (2) Advise, consult, and coordinate invasive species-related efforts with and between the departments of agriculture, land and natural resources, health, and transportation, as well as state, federal, international, and privately organized programs and policies;
- (3) Identify and prioritize each lead agency’s organizational and resource shortfalls with respect to invasive species;
- (4) After consulting with appropriate state agencies, create and implement a plan that includes the prevention, early detection, rapid response, control, enforcement, and education of the public with respect to invasive species, as well as fashion a mission statement articulating the state’s position against invasive species; provided that the appropriate state agencies shall collaborate with the counties and communities to develop and implement a systematic approach to reduce and control coqui frog infestations on public lands that are near or adjacent to communities, and shall provide annual reports on the progress made in achieving this objective;
- (5) Coordinate and promote the state’s position with respect to federal issues, including:
 - (A) Quarantine preemption;
 - (B) International trade agreements that ignore the problem of invasive species in Hawaii;
 - (C) First class mail inspection prohibition;
 - (D) Whether quarantine of domestic pests arriving from the mainland should be provided by the federal government;

(E) Coordinating efforts with federal agencies to maximize resources and reduce or eliminate system gaps and leaks, including deputizing the United States Department of Agriculture's plant protection and quarantine inspectors to enforce Hawaii's laws;

(F) Promoting the amendment of federal laws as necessary, including the Lacey Act Amendments of 1981, Title 16 United States Code sections 3371-3378; Public Law 97-79, and laws related to inspection of domestic airline passengers, baggage, and cargo; and

(G) Coordinating efforts and issues with the federal Invasive Species Council and its National Invasive Species Management Plan;

(6) Identify and record all invasive species present in the state;

(7) Designate the department of agriculture, health, or land and natural resources as the lead agency for each function of invasive species control, including prevention, rapid response, eradication, enforcement, and education;

(8) Identify all state, federal, and other moneys expended for the purposes of the invasive species problem in the State;

(9) Identify all federal and private funds available to the state to fight invasive species and advise and assist state departments to acquire these funds;

(10) Advise the governor and legislature on budgetary and other issues regarding invasive species;

(11) Provide annual reports on budgetary and other related issues to the legislature twenty days prior to each regular session;

(12) Include and coordinate with the counties in the fight against invasive species to increase resources and funding and to address county-sponsored activities that involve invasive species;

(13) Review state agency mandates and commercial interests that sometimes call for the maintenance of potentially destructive alien species as resources for sport hunting, aesthetic resources, or other values;

(14) Review the structure of fines and penalties to ensure maximum deterrence for invasive species-related crimes;

(15) Suggest appropriate legislation to improve the state's administration of invasive species programs and policies;

(16) Incorporate and expand upon the department of agriculture's weed risk assessment protocol to the extent appropriate for the council's invasive species control and eradication efforts; and

(17) Perform any other function necessary to effectuate the purposes of this [chapter].

(b) The council shall be placed within the Department of Land and Natural Resources for administrative purposes only and shall be composed of:

(1) The president of the University of Hawaii, or the president's designated representative;

(2) The director, or the director's designated representative, of each of the following departments:

(A) Business, economic development, and tourism;

(B) Health; and **[§194-3 Lead agencies; accountability.]** A state department that is designated as a lead agency under section [194-2(a) (7)], with respect to a particular function of invasive species control, shall have sole administrative responsibility and accountability for that designated function of invasive species control. The lead agency shall:

(1) Coordinate all efforts between other departments and federal and private agencies to control or eradicate the designated invasive species;

(2) Prepare a biennial multi-departmental budget proposal for the legislature forty days before the convening of the regular session of the legislature in each odd-numbered year, showing the budget requirements of each of the lead agency's assigned invasive species function that includes the budget requirements of all departments that it leads for that species, as well as other federal and private funding for that invasive species;

(3) Prepare and distribute an annual progress report forty days prior to the convening of each regular session of the legislature to the governor and the legislature that includes the status of each assigned function; and

(4) Any other function of a lead agency necessary to effectuate the purposes of this [chapter].
[L 2003, c 85, §4; am L 2004, c 10, §16; am L 2006, c 109, §2]

(C) Transportation; and

(3) The chairperson, or the chairperson's designated representative, of each of the following departments:

(A) Agriculture; and

(B) Land and Natural Resources.

(c) Representatives of federal agencies, the legislature, and members of the private sector shall be asked to participate or consulted for advice and assistance. Representatives of the legislature shall consist of eight members, as follows:

(1) Four senators, one from each county, to be selected by the Senate president; and

(2) Four representatives, one from each county, to be selected by the speaker of the House of Representatives.

(d) The Council shall meet no less than twice annually to discuss and assess progress and recommend changes to the invasive species programs based on results of current risk assessments, performance standards, and other relevant data. Notwithstanding any law to the contrary:

(1) A simple majority of voting members of the council shall constitute a quorum to do business; and

(2) Any action taken by the council shall be by a simple majority of the voting members.

(e) The Council shall submit a report of its activities to the governor and legislature annually. [L 2003, c 85, §3; am L 2004, c 10, §16; am L 2006, c 109, §§1, 2]

[§194-4 Relation of chapter to other laws.] Notwithstanding any other law to the contrary, and in addition to any other authority provided by law that is not inconsistent with the purposes of this [chapter], a department is authorized to examine, control, and eradicate all instances of invasive species identified by the Council for control or eradication and found on any public or private premises or in any aircraft or vessel landed or docked in waters of the State. [L 2003, c 85, §5; am L 2004, c 10, §16; am L 2006, c 109, §2]

[§194-5 Entry; private property.] (a) Whenever any invasive species identified by the Council for control or eradication is found on private property, a department may enter such premises to control or eradicate the invasive species after reasonable notice is given to the owner of the property and, if entry is refused, pursuant to the court order in subsection (d).

(b) If applicable, a duplicate of the notice so given shall be left with one or more of the tenants or occupants of the premises. If the premises are unoccupied, notice shall be mailed to the last known place of residence of the owner, if residing in the state. If the owner resides out of the state or cannot be expeditiously provided with notice, notice left at the house or posted on the premises shall be sufficient.

(c) The department may instead cause notice to be given, and order the owner to control or eradicate the invasive species, if such species was intentionally and knowingly established by the owner on the owner's property and not naturally dispersed from neighboring properties, at the owner's expense within such reasonable time as the department may deem proper, pursuant to the notice requirements of this section.

(d) If the owner thus notified fails to comply with the order of the department, or its agent, within the time specified by the department, or if entry is refused after notice is given pursuant to subsection (a) and, if applicable subsection (b), the department or its agent may apply to the district court of the circuit in which the property is situated for a warrant, directed to any police

officer of the circuit, commanding the police officer to take sufficient aid and to assist the department member or its agent in gaining entry onto the premises, and executing measures to control or eradicate the invasive species.

(e) The department may recover by appropriate proceedings the expenses incurred by its order from any owner who, after proper notice, has failed to comply with the department's order.

(f) In no case shall the department or any officer or agent thereof be liable for costs in any action or proceeding that may be commenced pursuant to this [chapter]. [L 2003, c 85, §6; am L 2004, c 10, §16; am L 2006, c 109, §2].

[§194-6 Entry; public property.] (a) Whenever any invasive species is found on state or county property or on a public highway, street, lane, alley, or other public place controlled by the state or county, notice shall be given by the department or its agent, as the case may be, to the person officially in charge thereof, and the person shall be reasonably notified and ordered by the department to control or eradicate the invasive species.

(b) In case of a failure to comply with the order, the mode of procedure shall be the same as provided in case of private persons in section [194-5]. [L 2003, c 85, §7; am L 2004, c 10, §16; am L 2006, c 109, §2]

[§194-7 Rules.] The invasive species council may adopt rules pursuant to chapter 91, to effectuate this [chapter]. [L 2003, c 85, §8; am L 2004, c 10, §16; am L 2006, c 109, §2]