REPORT TO THE TWENTY-FOURTH LEGISLATURE
REGULAR SESSION OF 2008

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 §194-2, Hawaii Revised Statutes
and
Section 28 of Act 213, Session Laws of Hawaii, 2007

December 2007

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 department'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 §194-2, HRS, to annually report to the Legislature on budgetary and other issues regarding invasive species.

Additionally, Section 28 of Act 213, Session Laws of Hawaii (SLH) 2007, requires the Department of Land and Natural Resources (DLNR) to prepare a report that includes the overall status of the invasive species efforts for Hawaii and all collected data, measures of effectiveness, cost breakdowns, and outcomes from: (1) Inspection, detection, and interception of, and *percentages* of [1]., invasive species at airports and harbors; (2) Control and eradication of invasive species currently established in Hawaii and; (3) Proactive steps taken for prevention of the introduction of invasive species, education and awareness efforts, and institution of policies and procedures. Act 213 further requires DLNR to jointly work with other agencies and the community and submit the report to the Legislature no later than twenty days prior to the convening of the Regular Sessions of 2008 and 2009.

BACKGROUND

Formal efforts to create a comprehensive invasive species program began with the Coordinating Group on Alien Pest Species (CGAPS), voluntarily formed in 1995, 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, (Act 85) 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 as Chapter 194, HRS.

HISC members include the chairs or directors of the DLNR, Agriculture (DOA), 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

[1] *This report includes actual and estimated numbers of introduced and invasive species detected in Hawaii (percentages of species prevented are not calculated).

(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
county 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 DOH chairs the Public Outreach Working Group.

COORDINATION OF INVASIVE SPECIES EFFORTS

Summary of Key Program Activities

Over the past calendar year, HISC met once to review and approve actions related to fulfillment of responsibilities identified by Chapter 194 HRS, and now detailed in the *Interim State of Hawaii Strategic Plan for Invasive Species Prevention, Control, Research and Public Outreach*.

HISC:

- Approved a spending plan for Fiscal Year (FY) 2008 for a budget of $4,000,000, that addresses the four interrelated plan components:
    - Prevention $736,400;
    - Response and Control $1,754,500;
    - Research and Technology $700,000;
    - Public Outreach $312,000; and
    - HISC Support (includes central services fee and contingency fund) $497,100

HISC working groups were also active in FY 2007 and they have proposed new actions for FY 2008.

- Agreed that staff should undertake a review the interim strategy in 2007-2008.
- Reviewed working group reports and spending related to the implementation of the *Interim State of Hawaii Strategic Plan for Invasive Species Prevention, Control, Research and Public Outreach*.

HISC and working group meetings held between November 2006 and November 2007

Meeting	Date	Lead Agency	Main issues
Public Outreach*	13-Aug-07	DOH	Invasive species awareness for Superferry, budget FY 08, aquatic invasives
HISC	19-Jul-07	DOA/DLNR	Approval of budget FY 08, project and working group overviews, strategic plan update (Appendix 4) budget, ant plan
Established Pests*	31-May-07	DLNR	
Public Outreach*	18-May-07	DOH	Budget FY 08, HISC public outreach
Prevention*	16-May-07	DOA	Biosecurity initiatives, budget FY 08, varroa mite, coqui frog
Public Outreach*	9-Mar-07	DOH	Awareness for port/airport workers, grants, strategic plan update
Established Pests*	7-Mar-07	DLNR	Noxious weeds rule review and risk assessment
Public Outreach*	30-Oct-06	DOH	Strategic plan update, Superferry

* HISC interagency working group meetings. Agenda and minutes are posted at http://www.state.hi.us/dlnr/dofaw/HISC/

HISC Project Areas
Accomplishments within the four HISC program areas--Prevention, Response and Control, Research and Technology, and Public Outreach as accomplished by the working groups established by the HISC Plan—are summarized below.

Prevention

The lead agency for the Prevention Working Group (PWG) is DOA.

The main prevention projects were:

- DOA continued risk assessments that were funded last year with intensive inspections of incoming cargo at the Honolulu International Airport and maritime ports.
- Implementation of a Weed Risk Assessment (WRA) system screening for plants led to the adoption of voluntary codes of conduct by Lyon Arboretum and Nursery Growers Association (see details below WEED RISK ASSESSMENTS). This $60,000 project was managed through DLNR in cooperation with the UH and Lyon Arboretum.
- DOH implemented a $350,000 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.

Response and Control (Established Pests)
The lead agency for the Established Pests Working Group (EPWG) is DLNR.
- Funded Projects: Managed by DLNR.

AQUATIC INVASIVE SPECIES RESPONSE TEAM: HIGHLIGHTS TO DATE FOR 2007

During 2007, the Aquatic Invasive Species (AIS) ResponseTeam made significant progress on all target species. HISC funding for this project for FY 07 was $135,000. Accomplishments included:

- Completion of new "Supersucker" Barge
- Successful eradication of an introduced Mushroom Anemone *Actinodiscus musciformis*
- Remote surveys for snowflake coral, *Carijoa riisei*

Three of the priority species for the AIS Response Team are alien algae (5 species), the mushroom anemone, and snowflake coral, *Carijoa riisei*.

<u>Alien Algae</u>:
- New "Supersucker" barge was constructed in 2007.
- New barge allows alien algae removal in areas outside Kaneohe Bay and can be transported and launched at any boat ramp.
- Barge has two pumps and can remove nearly 10 lbs of algae per minute.

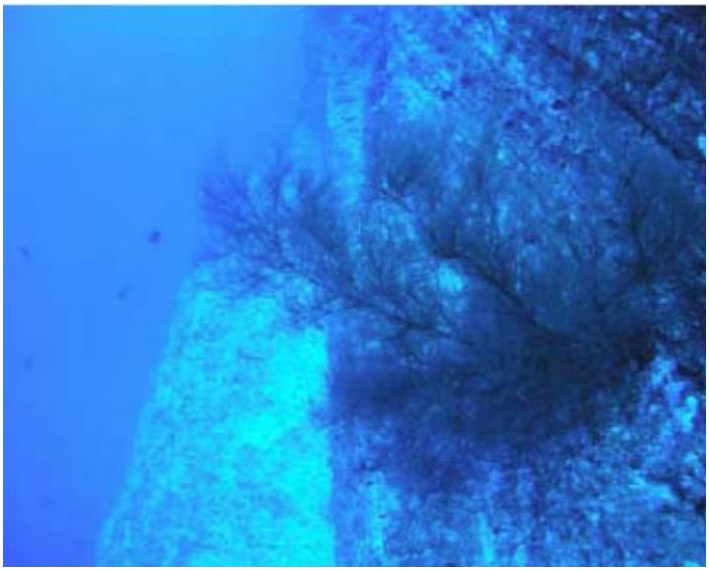
New "Supersucker" barge off Waikiki.

- Increased capacity allows larger areas of alien algae to be managed.
- Operation is a strong partnership between DLNR, UH, and The Nature Conservancy (TNC).

Mushroom anemone before eradication.

<u>Mushroom Anemone</u>:

- **First successful marine eradication in Hawaii.**
- Staff worked over one year to remove this organism.
- Two discreet populations are believed to be eradicated.
- Zero animals have been found since spring of 2007.
- Official declaration will be made late in 2007 or early 2008.



Black coral colony on Niihau in suitable snowflake coral habitat.

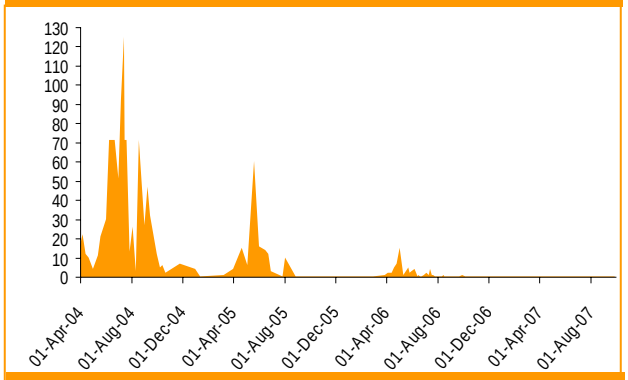
<u>Snowflake Coral</u>:

- Continuation of eradication attempt in Port Allen, Kauai.
- Additional surveys for snowflake coral were made in summer of 2007.
- In Kauai County, four populations are known to exist outside Port Allen.
- Surveys on Niihau did not detect snowflake coral in highly suitable habitat.

O‘AHU INVASIVE SPECIES COMMITTEE (OISC): 2007 HIGHLIGHTS TO DATE

Fiscal Year 07 HISC funding for the OISC project totaled $150,000. During 2007, OISC surveyed 13,044 acres for 31 plant, animal and invertebrate invasive species. Significant accomplishments include:

Estimated number of calling coqui frogs at Schofield East Range



In July 2004, there were approximately 125 calling coqui frogs. After two seasons of control work, the area is now quiet.

Graph courtesy Robin Yamamoto, U.S. Army DPW

Silence at O‘ahu’s only naturalized population of coqui frogs:
OISC and its partners in the O‘ahu Coqui Frog Working Group (OISC, DOA, United States (US) Army Department of Public Works, O‘ahu Army Natural Resources Program, and DLNR/Division of Forestry and Wildlife (DOFAW)) systematically sprayed and surveyed a 12 acre site infested with frogs between a Wahiawā neighborhood and Schofield East Range. A coqui frog has not been heard there since November of 2006.

Targeted nursery surveys for coqui frog:
Working with DOA and nursery owners, OISC staff surveyed nurseries that had recently received shipments from coqui frog infested areas. These targeted surveys will allow OISC and DOA to control the frogs before they move to other parts of the Island.

Early detection and rapid response of new island plant records and newly establishing species.
OISC eliminated the only known populations of two plant species and surveyed 2,450 acres for five other plant species that have only just begun to naturalize. Detecting weeds before they jump the fenceline is the most efficient way to eradicate invasive species.

Progress towards eliminating O‘ahu’s most threatening species:
OISC field crews surveyed 4,825 acres for *Miconia calvescens*, removing four mature trees and 825 seedlings. OISC’s steady work on this species has prevented major infestations from dominating O‘ahu’s forests.

Pulling miconia

Assistance to agency partners:
OISC assisted DOA by checking pheromone traps for nettle caterpillar and DOH by delivering dead birds for WNV testing.

MAUI INVASIVE SPECIES COMMITTEE (MISC): HIGHLIGHTS

During 2007, MISC made significant progress on all target species and received $300,000 in HISC funding in FY 2007. Accomplishments included:

- Over 42,751 acres surveyed for 14 invasive plant species.
- Total number of plants controlled: 82,208 (1,509 mature)

Dedicated gear, dedicated crew – controlling miconia.

The two top priority species for Maui are the forest invader, *Miconia calvescens*, and the noisy coqui frog, *Eleutherodactylus coqui*.

Miconia:

- Combined ground and aerial strategy allowed crews to survey 28,707 acres.
- Work by the six-person Hāna crew was augmented by week-long deployments of the upcountry plant crew.
- The National Park Service continued to support aerial control with funding and operational management.
- Analysis of data from well-defined management units showed a reduction in mature trees over time.
- Complete coverage of all aerial management units deemed possible within a two-year timeframe.
- Miconia data were presented at the international invasive plant conference in Perth, Australia.

Coqui Frog:


Trail building for access into the gulch.

- Field staff worked on 13 population centers (more than five calling frogs).
- Four populations have been eradicated – more than one year since last vocalization heard.
- Eight population centers have been contained.
- Work began in Māliko Gulch, Maui's largest infestation (127 acres).
- Significant progress occurred in the 53-acre residential rim portion of Māliko Gulch, with systematic spray operations.
- A fixed-spray system for the steep-sided gulch was designed; crews began creating access trails into the gulch.
- More funding is needed to tackle wildland infestation.

Public outreach was a high priority: Highlights included:

- Completion of an Early Detection Field Guide.
- Publication of spring and fall 12-page newsletters.
- Promotion of the annual Mālama i ka ʻĀina Award to recognize local efforts to stop the spread of invasive species.
- Participation in eight public events, reaching over 2,750 people.

Reaching the keiki at Maui Ocean Day.

MOLOKAI/MAUI INVASIVE SPECIES COMMITTEE: HIGHLIGHTS TO DATE FOR 2007

During 2007, the Molokai/Maui Invasive Species Committee made significant progress on all target species. Accomplishments included:

- Over 13,883 acres surveyed for 13 invasive plant species.
- Total number of plants controlled = 5,885 (1,773 mature).

The two top priority species for Molokai are the forest invaders, Australian tree fern (*Cyathea cooperi*) and *Miconia calvescens.*

Australian tree fern

- Over 86 acres of ground were surveyed with 136 plants controlled.
- The Australian tree fern was added as a survey target during the miconia aerial survey.
- Extensive outreach and door to door canvassing were completed in target areas.
- Successful outreach campaign has resulted in no sales of Australian tree fern on Molokaʻi.

Controlling Australian tree fern.

Miconia

- Miconia has invaded Maui, Hawaiʻi, Oʻahu, and Kauaʻi, but is not known within Molokaʻi. Early detection is critical to prevent its establishment on Molokaʻi.
- Over 12,919 acres of potential miconia habitat were surveyed by air in collaboration with TNC, Kalaupapa National Park, and DOFAW.
- No miconia was detected during the surveys.

Public Outreach

- Outreach materials were developed and installed at the airport kiosk, public wharf, and community boards.
- Monthly outreach articles were published in the local newspaper.
- Staff participated in the annual Earth Day event on Molokaʻi.
- Quarterly articles on invasive species were published in TNC's newsletter.
- Staff participated in community planning meetings to give input on invasive species issues.

Arundo donax for removal on Molokaʻi.

KAUAI INVASIVE SPECIES COMMITTEE (KISC): HIGHLIGHTS

During 2007, KISC continued working on prevention, detection, and control of targeted species and received $150,000 in HISC funding in FY 2007. Accomplishments included:

- Over 2,096 acres ground-surveyed for 14 invasive species.
- Total number of plants controlled: 23,569 (4,815 mature)
- Partnered with DOH and US Fish & Wildlife Service to assist with early detection of WNVs and avian influenza

The two top priority species for Kauai are the forest invader, *Miconia calvescens*, and the noisy coqui frog, *Eleutherodactylus coqui* which is limited to one known population on the island.

Miconia:

- Approximately 300 wild-land acres have been surveyed on-the-ground; both in known infested areas, as well as suitable habitat.
- No mature trees have been found since 2004.
- Primary infestation area is in Wailua River State Park and the Wailua Game Management Area.
- 595 seedling and vegetative plants were destroyed.
- Organization of a re-survey of the Wailua Homesteads neighboring area is underway involving almost 500 residential lots.
- Survey partners have included DOFAW, and DOA.

KISC & HDOA removing miconia

Coqui Frog:

KISC crewmember applying lime

- Partnerships within the Kauai Coqui Frog Working Group have helped to formulate and implement work strategies.
- 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 3,400 work hours have been expended do date this year alone.
- Infestation area has been reduced to only a few calling frogs with a goal of no calling frogs by November deemed feasible.
- Vegetation removal by a contractor using a hydro-axe has modified coqui habitat and improved access.
- KISC utilized both hydrated lime and citric acid for control work.

Public Outreach:

- Publication of a weekly Coqui News (http://www.hear.org/kisc/coqui_news/).
- Participation in county fairs, school curriculum, and community events.
- Public service announcements aired on local radio.

County fair participant with jar of coqui

BIG ISLAND INVASIVE SPECIES COMMITTEE (BIISC) HIGHLIGHTS 2007

BIISC worked to create a new early detection program for new weeds, evaluated progress and tried new methods for survey for current targets and received $200,000 in HISC funding in FY 2007.

Accomplishments for all targeted taxa:

- Over 12,300 acres surveyed
- A total of 300 acres covered
- 13,000 individual plants were treated
- A total of 2,600 BIISC worker hours expended

Miconia:

- BIISC continues to maintain a 40 mile containment perimeter stretching from Malama Ki in Puna to Ninoole in Hamakua.

- Crews continue to work five primary control sites, utilizing ground and aerial control methods. Two populations in Kona are slated for full eradication since these are considered incipient populations.
- Crews surveyed and controlled 5,977.5 acres
- Completion of evaluation and recommendation of miconia control on the Big Island (posted on BIISC website). Poster presentation at annual conservation conference.

Bocconia:

- Two sites currently being controlled. Wood Vally in Ka'u slated for containment, while Honomalino in Kona slated for eradication.
- Crews surveyed a total of 4,300 acres controlling a total of 1,478 plants
- Aerial surveys continue to be expanded in the Ka'u and Kona districts.
- Joint effort to control bocconia to be expanded with DOFAW and HAVO (Hawaii Volcano National Park) crews.

Fountain Grass:

- BIISC expanded its fountain grass control operations in the South Kona district in conjunction with DOFAW and HAVO actions in adjacent lands.
- BIISC crews controlled a total of 36 acres treating 3,413 plants.

Coqui:

- BIISC continues its popular Citric Acid Matching Program, where up to 9-50lb bags of citric acid is matched with purchases made by community members.
- Crews have assisted DOFAW on aerial control of coqui in the Manuka and Kalopa State Parks.
- BIISC continues to support community efforts in Volcano Village, Mauna Loa Estates and Fern Forest with coqui control efforts. This includes providing a cell phone for hotline calls in their community, assisting with roadside signage, and providing crews for large spray operations.

Early Detection:

- BIISC completed two pilot projects as part of its early detection program. Nursery surveys: BIISC contractors surveyed a total of 27 nurseries. Roadside surveys: BIISC contractors complete roadside surveys for the district of North Hilo. Both projects are expected to be expanded with the hiring of a full time early detection team.
- BIISC is currently working with partners to assess the early detection species list including WRA.

Outreach:

- BIISC continues to grow upon its "What's in Your Backyard" campaign to assist the public in invasive species identification, including providing technical assistance.
- BIISC has participated in numerous fairs and events to highlight invasive species, including the Hawaii County Fair and the Hawaii Nurseryman's Association plant sale.

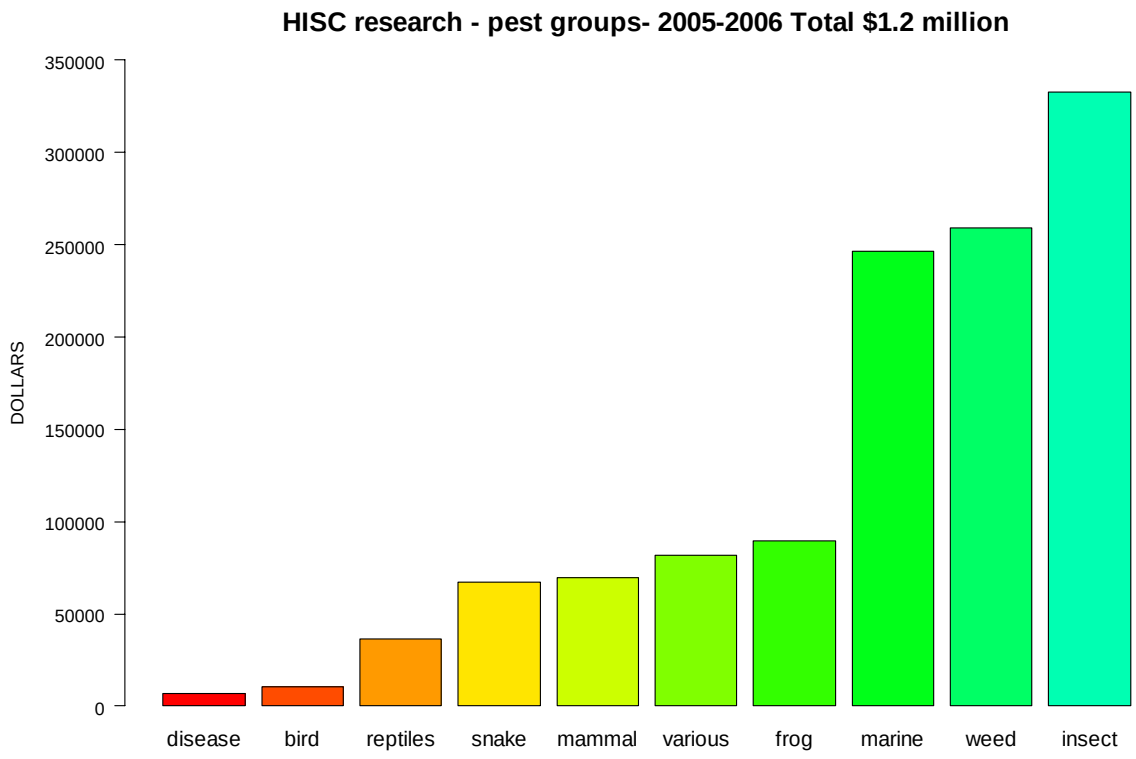
Research and Technology

Because of a reduction in the FY 2007 budget, no funding was available for research projects in FY 2007. Many projects funded in FY 2006 are still in progress. For FY 2008, a budget of $700,000 was approved by HISC for a request for proposals for research and technology projects that contribute to the effective management of invasive species in general and specifically target coqui frogs. This request for proposals closed on October 5, 2007. Forty-seven proposals requesting more than $2 million were received and were evaluated by an interagency committee late in 2007, funds will be allocated early in 2008.

Highlights of ongoing HISC funded research projects:

- Promising biocontrol measures investigated for major forest weeds *Miconia*, *Tibouchina*, and *Clidemia*.
- Investigation of biocontrol measures for the *Erythrina* gall wasp.
- Development of the Supersucker for control of alien algae on reefs.
- Development of commercial hot water treatment technology to control coqui frogs in shipments of plants from frog infested areas destined for frog free areas.
- Development of lures to detect and trap stinging nettle caterpillar moths- these used to delimit and control moths introduced from the Big Island to other islands.

The focus of research grants to date has been on a variety of pests. Between FY 2005 and 2006, a total of $1.2 million dollars has been awarded to researchers working principally on control, biocontrol, early detection and risk assessments. Nine major groups of research providers were funded with UH receiving 52% of the funds.


HISC research - pest groups- 2005-2006 Total $1.2 million
DOLLARS
350000
300000
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disease
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reptiles
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various
frog
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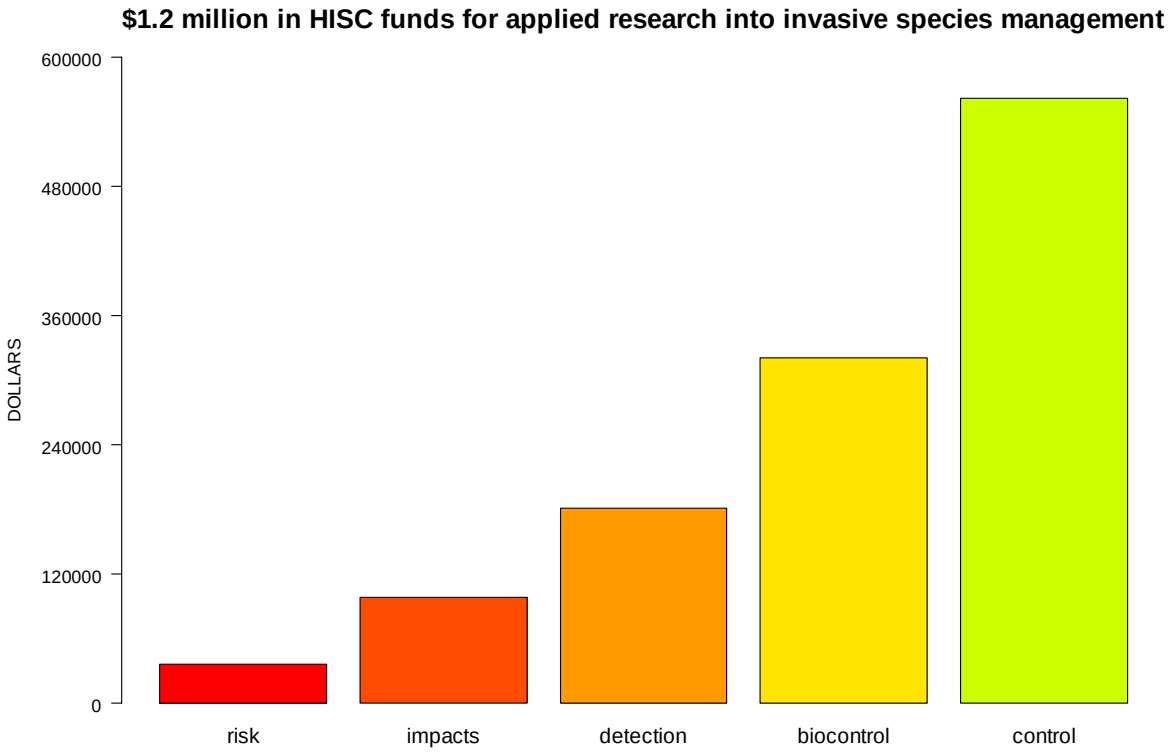
$1.2 million in HISC funds for applied research into invasive species management
DOLLARS
600000
480000
360000
240000
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risk
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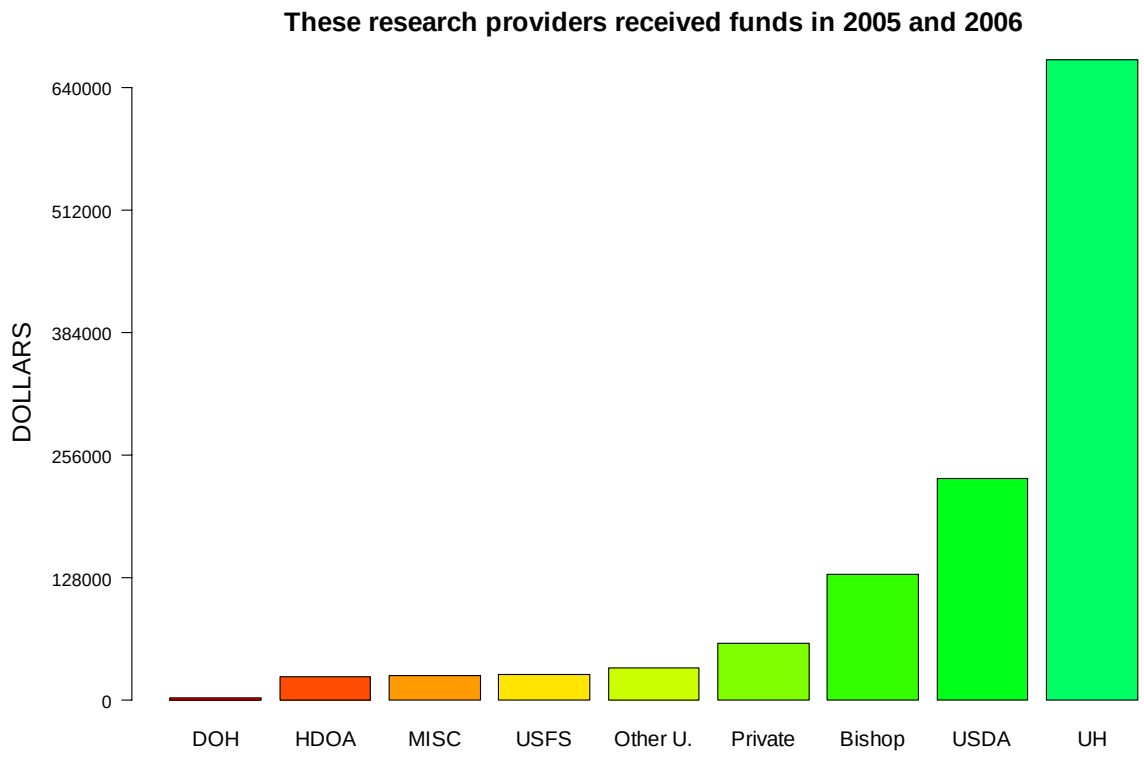


Public Outreach

The lead agency for the Public Outreach Working Group (POWG) is DOH. DOH and DLNR implemented projects funded by HISC totaling $230,000.

- HISC funds supported outreach staff on the Big Island, Oahu and Kauai, and the CGAPS Coordinator (See Appendix 1)
- Initiated peer learning days for all HISC outreach staff and interested cooperators.
- Wrote directed and funded public service announcements for local and statewide efforts.
- Planned for the release of outreach grants to encourage other educators and service providers to include invasive species messages.
- Measured success through surveys of public opinion (Appendix 1)
- POWG updated their strategic plan.
- Reviewed 10 proposals for the small grants program that focuses on the key messages of the interim strategic plan (summarized below).

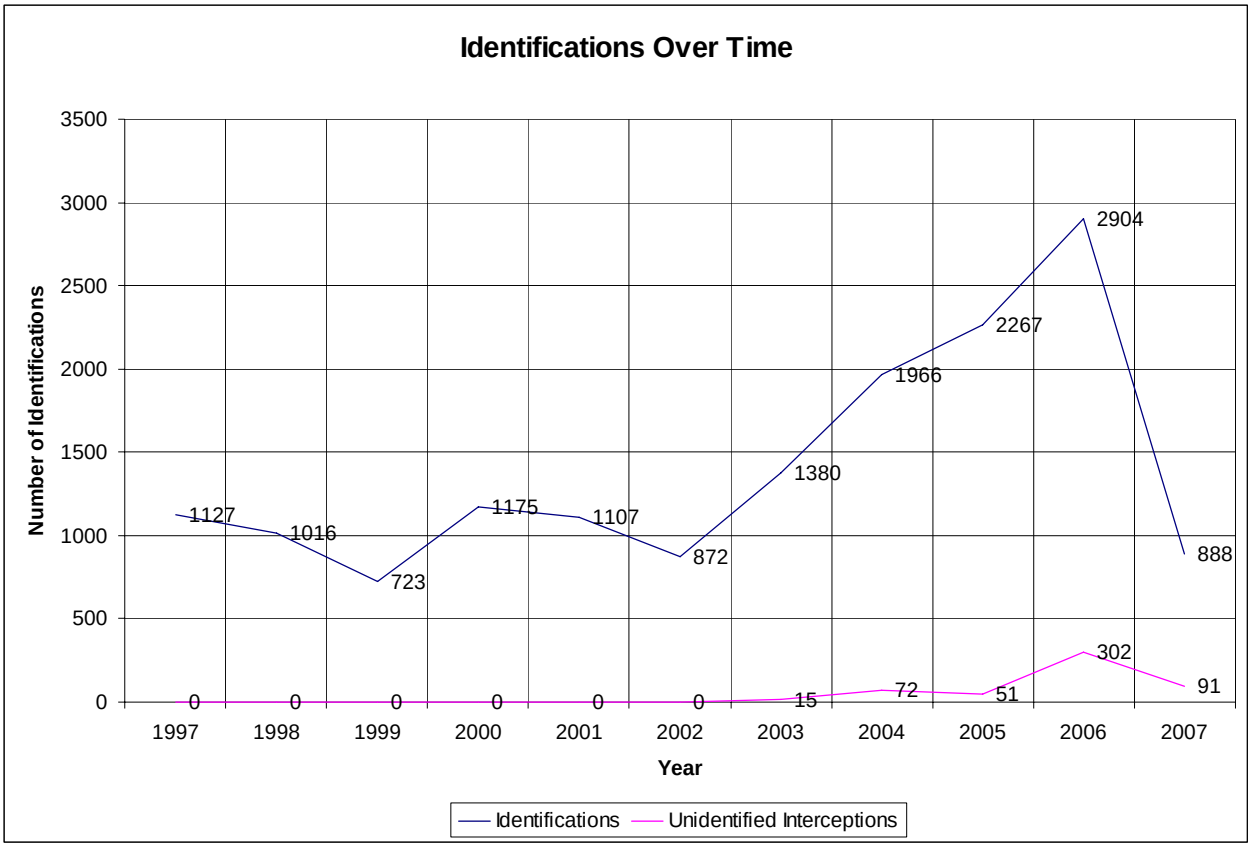
OVERVIEW OF THE INVASIVE SPECIES PROBLEM IN HAWAII

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
- Sago palm scale -1998
- Little fire ant - 1999
- Citrus leafminer - 2000
- nettle caterpillar 2001
- Giant whitefly - 2002
- Pickleworm – 2003
- Cardin's whitefly – 2003
- Papaya mealybug – 2004
- Aedes japonicus japonicus (type of mosquito) -2004
- Large orange sulfur - 2004
- Glassy-winged sharpshooter - 2004
- Macadamia felted coccid - 2005
- Erythrina gall wasp – 2005
- Thrips parvispinus 2006
- Asian citrus psyllid 2006
- Varroa mite 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 are 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 ***Weed Risk Assessments***).

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 DOA'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. The smaller islands of Lanai and Molokai have had complete roadside surveys in the past two years. The Big Island and Kauai projects are in the initial stages and results of these first surveys will be available this 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 based on studies in the Galapagos on invasive trees.

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 towards 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 DOA and US Department of Agriculture (USDA). There is a great value in preventing the introduction of a new pest or disease since the cost of its impacts and management are 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 bourn 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 DOA 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.

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 gymnorrhiza* 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 dollars a year.

Established ungulates (hooved animals) are another major threat to native habitat. Ungulates in Hawai‘i 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 towards 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 Hawai‘i 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 Kaua‘i 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 outcompete 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 Kane‘ohe Bay, O‘ahu and Waikiki, O‘ahu have experienced algal blooms or have growing invasive algae populations. Another marine invasive, snowflake coral (*Carijoa* sp.), outcompetes 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 Hawai‘i, 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 Hawai‘i 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 Hawai‘i 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 Hawai‘i for native waterbirds and 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 fibropappiloma, 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

Biocontrol can be one of the most successful means of controlling a widespread invasive species throughout its range. A successful biological control program eventually 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. The comprehensive testing systems now available allow us to select agents that are highly specific to the targeted invasive species.

The main risks of biological control programs are: 1) They may have little or no long-term effect on the target populations; 2) There may be adverse effects on indigenous species or other desirable species. Current modern methods of rigorous pre-release investigation should address this; many agents have now been released worldwide without major adverse or unintended consequences. The costs of establishing a biological control program can be high (up to $1–2 million) for a large program with multiple agents- due mainly to the testing process designed to test for possible unintended consequences prior to releasing an agent. It is not feasible to reliably predict the outcome of a biological control project; internationally, many agents introduced for biological control fail to control the target species; and even where a biological control agent is effective it may take many years before there are meaningful decreases in weed or insect populations. More biological control efforts should be supported for widespread invasive species especially where the costs of leaving them uncontrolled are unacceptable.

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. During the last 12 months, there have been a number of examples of inter-island transport of invasive species including coqui frogs and stinging nettle caterpillar from the Big Island to Molokai, Maui and Oahu. The proposed addition of new means of inter-island transport such as the Superferry increase 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 uninfested 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 (like 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.

Red Imported Fire Ant (RIFA) cost-effective action in Hawaii entails implementation of prevention, early detection and rapid response treatment programs.

HISC sponsored one of the authors of the following article to write a plan on the prevention and management of RIFA.

The red imported fire ant, Solenopsis invicta, has created billions of dollars in costs annually, spreading as an invasive species across the southern United States. In 1998, the red imported fire ant spread into California creating highly probable future introduction via shipped products to Hawaii. The paper presents the estimation of potential economic impacts of the red imported fire ant (RIFA) to the state of Hawaii. It focuses on the economic sectors of (1) households, (2) agriculture (cattle and crop production), (3) infrastructure (cemeteries, churches, cities, electrical, telephone, and cable services, highways, hospitals and schools), (4) recreation, tourism and business (hotels/resort areas, golf courses, commercial businesses and tourists), and (5) government expenditures (with minimal intervention). The full annual economic costs of the red imported fire ant to Hawaii are estimated (in US$ 2006) to be $211 million/year, comprised of $77 million in damages and expenditures and $134 million in foregone outdoor opportunities to households and tourists. The present value of the projected costs of RIFA over 20-year period after introduction total $2.5 billion.

Gutrich, J.J., VanGelder, E., and Loope, L. (2007) Potential economic impact of introduction and spread of the red imported fire ant, *Solenopsis invicta*, in Hawaii, Environ. Sci. Policy

Over 20 years (discounted at 3%) and investing in prevention activities at $5 - 10 million a year, your net present value of prevention costs equal $75- $150 million whereas economic costs from a full invasion equal $2.5 billion.

Increased threat of brown tree snake from Guam

Efforts in Guam to prevent the introduction of brown tree snakes to Hawaii and other islands were at risk when budget arrangements for paying the 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.

INTERIM PLAN UPDATE

HISC was established 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. (§194-2(a)(1), HRS)

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.

The following summarizes the previously approved interim plan (2003), and incorporates changes suggested to date by working groups and HISC. It reprioritizes actions based on work already accomplished and current issues, and highlights the connection between working groups and priorities for funding in the areas of Prevention, Response and Control, Research and Technology and Outreach. A new version of the strategic plan has not been formally adopted by HISC. The 2003 version of the strategy is available for comparison at: http://www.state.hi.us/dlnr/dofaw/HISC/HISC%20Documents/Interim%20Invasive%20Species%20Strategic%20Plan.pdf

HISC

Voting members: DLNR, DOA DOH, DBEDT, DOH, UH
Non-voting members: One (House) representative and one senator from each County
Invited: Federal agencies, non-government organizations, Counties.

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.

- Maintain a broad overview of the invasive species problem in the State (§194-2(a)(1), HRS)
- Provide support and direction to HISC working groups.
- Advise the Governor and Legislature on budgetary and other issues regarding invasive species (§194-2(a)(10), HRS) .
- 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.
- Provide annual reports on budgetary and other related issues to the Legislature 20 days prior to each regular session.
- Identify and prioritize each lead agency's organizational and resource shortfalls with respect to invasive species (§194-2(a)(3), HRS)
- 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 (§194-2(a)(4), HRS)
- Designate DOA, DOH or DLNR as the lead agency for each function of invasive species control, including prevention, rapid response, eradication, enforcement, and education (§194-2(a)(7), HRS)
- Develop a comprehensive and timely invasive species listing process for use by all state agencies.

HISC Support

HISC Council Support Goal: Provide administrative and technical support for HISC and its working groups.

HISC Support Objectives and Time frame:

- Advise, consult and coordinate invasive species-related efforts with and between the DOA, DLNR, DOH, DOT, UH, and other state, federal and private entities. (§194-2(a)(2), HRS)
- Coordinate efforts and issues with the Federal Invasive Species Council, the National Invasive Species Management Plan, the Hawaii Aquatic Invasive Species Advisory Council, Alien Aquatic Organism Task Force and any new proposed federal legislation.
- 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 (§194-2(a)(12), HRS).
- Develop a web based mapping and communication system for partnership programs and agencies that will provide information on the distribution, on going control work, and status of key invasive species.
- Identify all federal and private funds available to the State to fight invasive species and advise and assist state departments to acquire these funds.
- Designate invasive vertebrate pests.
- 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 (§194-2(a)(13), HRS)
- Review the structure of fines and penalties to ensure maximum deterrence for invasive species-related crimes (§194-2(a)(14), HRS) and suggest appropriate legislation to improve the State's administration of invasive species programs and policies (§194-2 (a)(15), HRS)
- Provide annual reports on budgetary and other related issues to the legislature 20 days prior to each regular session (§194(a)(11), HRS)

HISC Support - Measures of Effectiveness

- Active involvement of state agencies with HISC
- Numbers of entities participating in HISC working groups
- Successful administration of all HISC monies
- Increased non-state funds for invasive species programs in Hawaii.

HISC Interagency Working Group

Chair of working group: DOT
Participating HISC members: DLNR, DOA, DBEDT, DOH, DHHL, DOD, UH, DCCA, Counties

Goals: (1) Assure coordination in invasive species management and control programs of state, federal and private sector agencies; and (2) Determine how agencies can work together to share resources and responsibilities best to address specific pest control problems.

HISC Interagency Working Group Tasks:

- Advise, consult, and coordinate invasive species-related efforts with and between DOA, DLNR, DOH and DOT, as well as state, federal, international, and privately organized programs and policies.
- 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.
- Coordinate efforts with federal agencies to maximize resources and reduce or eliminate system gaps and leaks, including deputizing USDA's plant protection and quarantine inspectors to enforce Hawaii's laws.
- Develop a web based reporting system to improve communication between agencies that issue permits for the importation or movement of organisms and agencies responsible for enforcement.
- Identify and prioritize each lead agency's organizational and resource shortfalls with respect to invasive species (§194-2(3), HRS)

Resources

(Chair of working group: DBEDT**)**
(Participating HISC members: DLNR, DOA, DOT, DOH, UH, Counties**)**

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.

HISC Resources Working Group Tasks:

- Identify all county, state, federal and private funds expended for the purposes of the invasive species problem in the State.
- Identify all county, state, federal and private funds available to fight invasive species and advise and assist state departments to acquire these funds.
- Develop dedicated funding sources for invasive species prevention and control programs (e.g. Island Invasive Species Committees, biocontrol).
- Identify and prioritize each lead agency's organizational and resource shortfalls with respect to invasive species (§194-2(3), HRS).

Investing to protect Hawaii from invasive species

The budget for HISC falls within the priority focus areas of Prevention, Response and Control (with an emphasis on early detection and rapid response), Research and Technology and Outreach. The interagency working groups- specifically; Prevention, Established Pests, Research and Technology, and Outreach, work to develop priority projects within their budget category and in cooperation with the other working groups that fill in gaps and increase capacity for invasive species response in Hawaii as well as review the progress of previously funded projects. Working groups make recommendations for the components of the annual budget and HISC reviews and approves the final budget.

Prevention

Chair of working group: DOA
(Participating HISC members: DLNR, DOT, DOH, UH, DCCA, DOD, Counties)

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.

Preventing the introduction of alien invasive species is the cheapest, most effective and most preferred option and is a high priority.

Prevention Objectives:

- Identify and seek to manage possible vectors and pathways of terrestrial and aquatic invasive species into and throughout Hawaii. Important pathways for introductions include: legal and illegal national and international trade, tourism, shipping, ballast water, fisheries, agriculture, construction projects, ground and air transport, forestry, horticulture, landscaping, pet trade and aquaculture.
- Prevent the movement of known invasive species between islands.
- Identify terrestrial and aquatic species that are at high risk of being introduced to the State or being spread within the State by legal and illegal trade.
- Minimize aquatic invasive species introductions and transfers via, researchers, ballast water, ballast sediments, hull fouling, and authorized introductions of nonnative species (ongoing).
- Put in place legal controls and a risk assessment system for intentional introductions. These should only take place with authorization from the relevant agency or authority. Authorization should require comprehensive evaluations based on economic, human health, standard of living and biodiversity considerations (ecosystem, species, genome).
- Review the structure of fines and penalties to ensure maximum deterrence for invasive species-related crimes.

- Identify introduced species that are detected during inspections or are not stopped by prevention activities and *identify and record all invasive species present in the State* **(§**194-2(a)(6), HRS).
- Incorporate and expand upon DOA's Weed Risk Assessment protocol to the extent appropriate for HISC's invasive species control and eradication efforts **(§**194-2(a) (16), HRS)
- Develop collaborative industry guidelines and codes of conduct, which minimize or eliminate unintentional introductions.
- Develop a comprehensive "approved planting list" to ensure that no invasive species are being planted in state projects or by any state contractors e.g. screened by the WRA protocol.
- Coordinate and promote the State's position with respect to federal issues, including:
    - Quarantine preemption;
    - International trade agreements that ignore the problem of invasive species in Hawaii;
    - First class mail inspection prohibition;
    - Whether quarantine of domestic pests arriving from the mainland should be provided by the federal government;
    - Coordinating efforts with federal agencies to maximize resources and reduce or eliminate system gaps and leaks, including deputizing USDA's plant protection and quarantine inspectors to enforce Hawaii's laws;
    - 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;

Prevention - Measures of Effectiveness

- Number of invasive species prevented from arrival at ports of entry
- Measures in place to prevent invasive species arrival and establishment via
- Names and numbers of high-risk species threatening Hawaii and targeted for prevention activities.
- Increased fines for intentional introduction of invasive species

Response and Control- Established Pests

Chair of working group: DLNR
(Participating HISC members: DOA, DOT, DOH, DHHL, DOD, Counties)

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.

Where it is achievable, eradication is the best management option for dealing with alien invasive species when prevention has failed. It is much more cost effective financially than ongoing control, and better for the environment. Technological improvements are increasing the number of situations where eradication is possible, especially on islands.

One of the most important improvements has been in "Early Detection". This term includes the ability to consistently and systematically survey for newly establishing species, identify these species correctly and use mapping and data management to identify where all known individuals are located. Successful eradication is only possible with support from early detection that includes taxonomic experts, agency and public awareness and accountable documentation.

Response & Control Established Pests Objectives:

- Implement improvements to capacity for detection, eradication and control e.g. increased staffing, training and infrastructure, to respond to both terrestrial and aquatic invasive species.
- Detect new invasive species while they are still eradicable.
- Immediately target high priority invasive species that are candidates for eradication in all or part of their range e.g. coqui frogs on Oahu and Kauai.
- Develop and implement a decision making protocol for targeting species for eradication and or control efforts.
- Review and update DLNR's Injurious Wildlife list and DOA's Noxious Weed list as needed in a timely manner.
- 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 (§194-2 (12), HRS)
- Eliminate existing invasive plant species from public projects and contracts.
- For those species that do arrive in Hawaii identify and record all introduced and invasive species present in the State (§194-2(a)(6), HRS).
- Identify and prioritize each lead agency's organizational and resource shortfalls with respect to invasive species (§194-2(a)(3), HRS)
- Determine what species are invasive to trigger access provisions onto private lands.
- Review and revise regulations governing the introduction of biological control agents.
- Develop management plans for widespread vertebrate pests.
- Develop and disseminate better methods for excluding or removing alien species from traded goods, packaging material, ballast water, personal luggage, aircraft and ships.
- For those species that are not stopped by prevention activities identify and record all

invasive species present in the State (§194-2(a)(6), HRS).

Response & Control - Measures of Effectiveness

- Number (area, #'s) of invasive species eradicated and/or controlled.
- Prioritization processes identified and in place.
- Implementation of the aquatic invasive species, WNV, and red-imported fire ant plans
- Maintaining a zero tolerance for priority species where they are eradicable or absent e.g. miconia on Kauai, Oahu and Molokai
- Number and names of species, habitats, ecosystems, landscapes, agricultural or other managed areas protected because of control efforts.

Research and Technology

Chair of working group: UH
(Participating HISC members: DOA, DOT, DOH, DLNR, DEBT)

Research and Technology Goals: 1) Encourage researchers to address the problems created by alien invasive species. 2) Encourage the development and implementation of new technology to prevent the establishment or control of invasive species. 3) Develop effective, science-based management approaches to control alien invasive species. 4) Effectively communicate the results of research to the field where it can be applied. 5) Promote interagency collaboration and stimulate new partnerships.

Research and Applied Technology Objectives and Time frame:

- Develop and oversee a program to solicit research services and the application of new technology to invasive species efforts in Hawaii.
- Develop new technology (chemical, mechanical, biological) for large-scale treatment of priority invasive species (e.g. marine invasive algae, coqui frogs, ants etc).
- Expand off-site exploration and screening for biocontrol agents for high-impact established invasive species (e.g. miconia) already present in the State.
- Develop and implement objective criteria for the evaluation of proposed projects that includes expert reviewers by topic on all proposed projects.
- Communicate the results of supported projects for the benefit of agencies and individuals working on invasive species issues in Hawaii.
- Areas of work to support include biological control, more effective detection efforts, taxonomic services, increased knowledge base of target organisms, economic impacts of invasive species, geographical information system tools and associated database management, and implementing new technology.
- Develop new tools for effective early detection and monitoring of terrestrial and aquatic invasive species populations.
- Provide taxonomic services for identification of terrestrial and aquatic invasive species in a timely manner.

- Implement the risk assessment protocols for all taxa (screening) and seek voluntary compliance from local industry groups, government agencies and the public where necessary.
- Develop technology with shipping industry for on-board treatment of ballast water and surface treatment to minimize hull fouling.
- Obtain cooperation with airlines industry for more efficient screening and inspection of baggage and cargo.

Research and Applied Technology - Measures of Effectiveness

- Number of new technologies developed for invasive species management.
- Number of biological control agents tested and introduced
- New technology developed for on-board treatment of ballast water
- Number of taxa screened using standardized science based risk assessment systems.

Public Outreach

Chair of working group: DOH
(Participating HISC members: DLNR, DOT, DOA, UH, DCCA, DHHL, Counties)

Public Outreach Goal: Educate the public and private sector about invasive species to positively affect perception, action and funding for control and prevention.

Outreach Objectives:

- Foster awareness and concern in the general public about invasive species.
- Increase public and private support.
- Seek measurable changes in behavior.

Promote the following one sentence messages to the public:

- Protect Hawai‘i.
- 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.
- Don’t Sell or Buy a Pest.
- Keep Pets Contained.
- Buy Local.
- Plant Native Species (promote the value of biodiversity).

Priority Audiences include:

- 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, who will be the next generation of decision makers
- And the general public, in order to raise awareness of and concern for invasive species issues

Outreach - Measures of Effectiveness

- Agency adoption of rules and policies against invasive species.
- Adoption of codes of conduct by businesses.
- Track number of print and broadcast media mentions.
- Number of "hits" on invasive species web page.
- Number of callers on pest hotline.
- Number of education materials produced
- Number of people reached through talks and displays
- Results from a public awareness survey.
- Number of invasive species educational programs and community events implemented by staff.
- Number of volunteers recruited and/or referred to invasive species projects.

IDENTIFICATION OF ALL INVASIVE SPECIES IN THE STATE

Bishop Museum staff regularly publishes estimates of alien species of plants, animals, and invertebrates growing wild in Hawaii. However, they do not measure the relative harmfulness 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. More needs to be done to ensure that good information is kept following standardized methods to support state needs for practical management applications.

MONEY SPENT ON INVASIVE SPECIES MANAGEMENT IN HAWAII

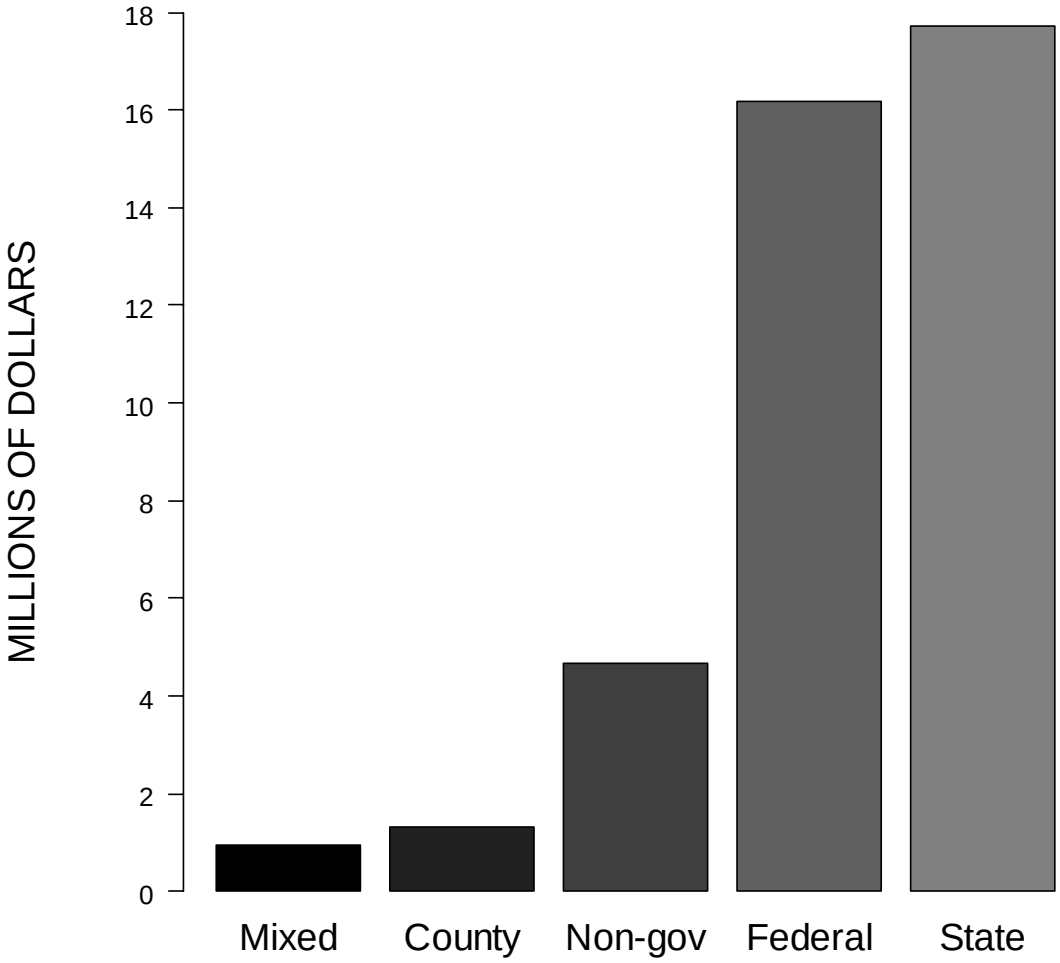
Annual spending on government sponsored projects beginning or ending in 2006

In 2002, the Legislative Reference Bureau study, "Filling the gaps in the fight against invasive species" reported annual spending of around $7 million on invasive species in the Hawaii. The same study identified minimum needed spending of $50 million to deal with principal threats to Hawaii's economy, natural environment and people's health and lifestyle.

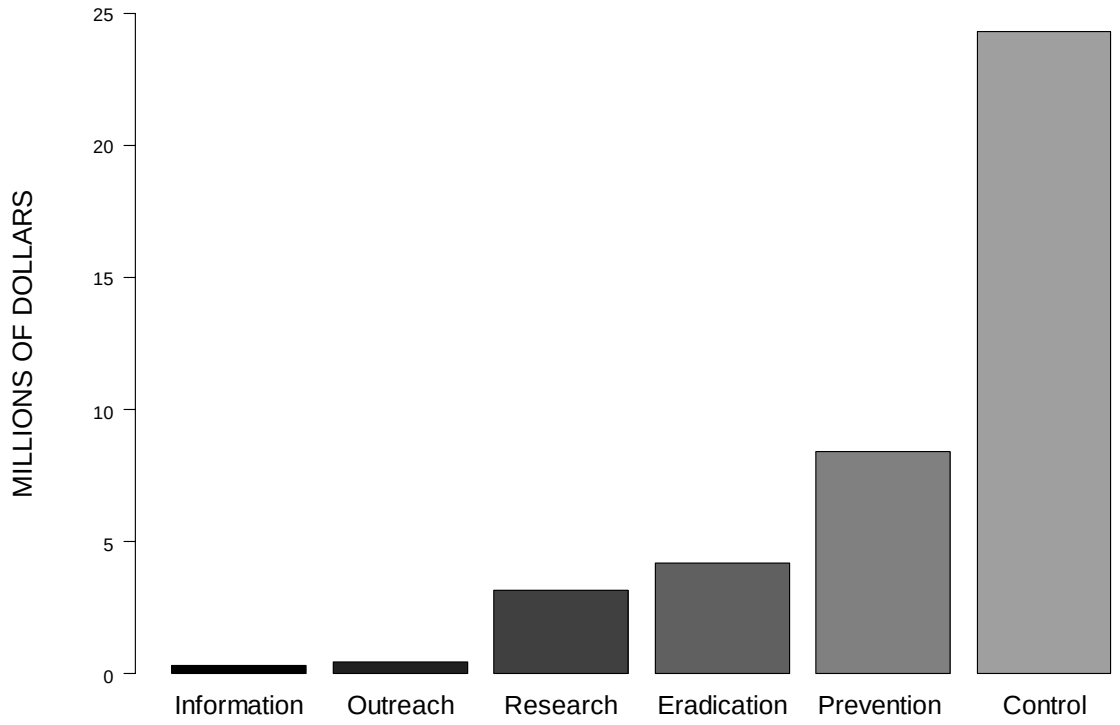
The HISC Coordinator surveyed annual spending statewide on invasive species projects that were sponsored by county, state and federal agencies. Only projects that started or ended in 2006 were considered. The level of detail provided by project managers varied- only broad patterns could be identified. The survey provided good data but cannot be considered exhaustive, because it was difficult to find information about all funded projects. For example information about research projects carried out by UH is undoubtedly incomplete.

Government sponsored spending totaled at least $40.8 million. State and federal agencies often co-sponsored projects dealing with invasive species. Funding levels were more or less evenly split between state and federal agencies probably due to the fact that it is a common policy that funding requires state or federal matching funds.

Maui County was responsible for most of the (county) funding directed at invasive species through their environmental program. Counties contributed some funds for work on coqui frogs to eradicate known populations on Kauai and undertake maintenance control on the Big Island. Non-government funding exceeded $4 million and was provided as the matching funding from private sector and non-governmental agencies.



Funding sources for government sponsored projects focused on invasive species during a one year period beginning or ending in 2006 based on State, Federal or calendar years as appropriate for reporting agency.



Government spending supported invasive species management focused on control, prevention, eradication, research, outreach and information systems during a one year period beginning or ending in 2006 based on State, Federal or calendar years as appropriate for reporting agency.

Prevention efforts totaled $8.1 million and were mainly from DOA's Biosecurity Program. Prevention spending is expected to increase as DOA appoints 50 new inspectors that will work at all of Hawaii's airports. Prevention funding included $ 0.58 million of state and federal funds directed at protecting Hawaii from the brown tree snake.

Eradication efforts totaled $4.2 million and were principally carried out by invasive species committees on each of the Islands. Their programs focus on early detection and eradication of incipient invaders before they become widespread and complete eradication of a target species from individual islands was still considered feasible, e.g. miconia and coqui eradication efforts on Kauai, Oahu and Maui.

Control efforts against widespread invasive species totaled $24.3 million. More than half of the control effort was directed at feral animal control to protect high value native ecosystems– primarily targeted pigs, but also included feral cattle, goats, and deer, much of that done in cooperation with private land owners. Other species that were controlled include a variety of weeds and predators of native forest and sea birds such as rats, feral cats and mongoose. DLNR's Division of Aquatic Resources (DAR) controlled marine invasive species and made significant technological improvements to its "Supersucker" to control alien algae on reefs around Oahu.

Invasive species research totaled $3.1 million and supported effective management through improving our understanding of target species and the development of control techniques and technology (including biocontrol).

Estimated annual cost of invasive species/pest management in Hawaii

According to a 2004 U.S. Environmental Protection Agency (EPA) report,* household spending on pesticides (excluding fungicides) in the US as a whole is about $7.20 per person. When this is multiplied by the number of people in Hawaii, the State's share is equivalent to $9 million annually. Government and industry spending on pesticides nationally equated to $4.84 per person which would equate to $6 million dollars spent on pesticides in Hawaii. Application costs typically range from one to twenty times the cost of any given pesticide. Assuming that application costs are equal to the cost of pesticides, the estimated spending on pest control are in the neighborhood of $18 million for households and $12 million for government and industry. These figures are likely underestimates considering that at least 280,000 pounds of sulfuryl fluoride was sold in 2005 to control termites at an estimated cost to property owners of about $12.6 million.

The landscaping and agricultural sectors have an estimated combined worth of about $1.08 billion in Hawaii. Using cost estimates from UH's College of Tropical Agriculture and Human Resources (CTAHR) for pest and weed control costs for 10 different crops in diversified agriculture, average spending as a proportion of revenues was 9%; ranging from zero to 23%. This suggests a cost of pest and weed control of approximately $82 million for these sectors.

Based on the above estimates, it is believed that at least $153 million is spent statewide annually on the management of harmful alien species. This is a small fraction of the total annual Hawaii State and local government spending in all areas estimated at $11 billion in 2005 (US Census Bureau). However this estimate does not consider the added costs of lost agricultural production or the loss of valued native species habitat. For example, by some estimates, the Hawaiian agricultural sector has suffered $300 million dollars in lost export opportunities annually due to fruit fly infestations which resulted in strict controls in exports to the mainland and overseas. Meanwhile it is hard to quantify in monetary terms the losses of natural resources due to declining native forest and watersheds, population declines of native species, extinctions brought about by introduced species and other indirect consequences of alien invasive species.

It is anticipated that government spending in this magnitude will continue in the future. Major problem species continue to arrive via major pathways some of which are inadequately controlled. For those invasive species that are here already, many are not being addressed, and many valuable sites and resources do not have controls in place to mitigate their impacts. In short, current efforts do not adequately address all threats. Not all threats can or should be addressed and priorities need to be set and most significant addressed first. There is clearly a value in reducing the frequency of arrival and establishment of serious new invasive species and pests, and being able to control and eradicate them once here e.g. red imported fire ant, miconia.

* Kiely, T.; Donaldson, D.; Grube, A.: 2004 Pesticide industry sales and usage 2000 and 2001 Market estimates US Environmental Protection Agency Washington, D.C. 32pp

Type of spending	Millions	Method
Government Spending Hawaii (invasive species)	$41	Estimate based on projects implemented in 2006
Agriculture (pest and weed control)	$82	9% of industry value
Household (pest control)	$18	Based on EPA estimates for pesticide use
Government/Industry (pest control)	$12	Based on EPA estimates for pesticide use
	$153	

ORGANIZATIONAL AND RESOURCE SHORTFALLS

As shown above, spending on invasive species management in Hawaii is significant, and there are few estimates of costs in terms of lost productivity and lost opportunity e.g. access to markets for Hawaiian products. Many invasive species known from other parts of the World could have serious consequences for Hawaii should they arrive, including the potential to seriously impact the economy, natural environment, and the health and lifestyle of Hawaii's people and visitors e.g. WNV, avian influenza, red imported fire ant, ohia rust, brown tree snake etc.

In short, a balance needs to be struck between the seriousness of the threat posed by invasive species and the adequacy of the response to mitigate that threat. More needs to be done. What is done needs to be effective and in proportion to the problem.

Further needs

Hawaii is well known for its invasive species problem. Hawaiian experts and state agencies have taken significant steps toward addressing the problem. Those actions and individual experts are well regarded amongst experts in the field both nationally and internationally. Consistent and comprehensive actions that incorporate the lessons learned by projects developed with HISC funding are needed to protect Hawaii.

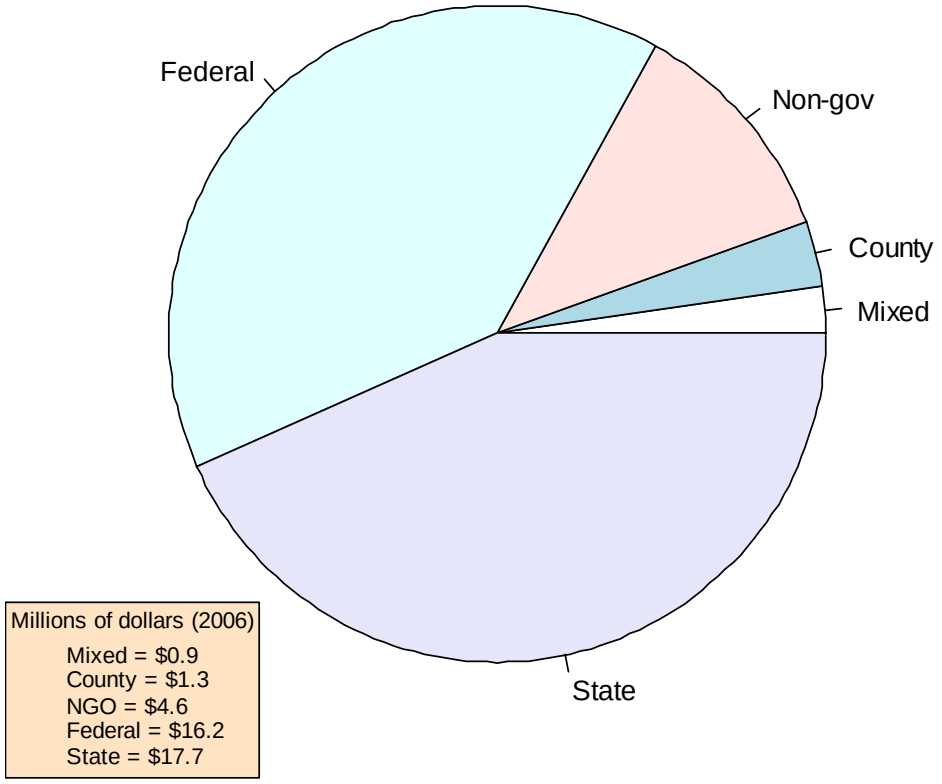
More needs to be done; What is needed:

- Better laws and rules to support effective enforcement action to prevent the 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 control in high value native forest areas
- Biocontrol- for widespread pests
- More control methods to address newly naturalizing plants already present in Hawaii
- Public support

FUNDING SOURCES FOR INVASIVE SPECIES MANAGEMENT IN HAWAII

*See Money Spent on Invasive Species Management in Hawaii.

Spending on government supported invasive species management projects in Hawaii were sourced from USDA, US Fish and Wildlife Service, DOD, National Park Service, HISC, DLNR and DOA. Individually most projects relied on funds from both state and federal sources though county and non-governmental organizations contributed. Mixed funding sources meant that the reporting agency did not distinguish where funds were from but is generally state and federal sources.



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 interim strategy and legal mandates. Two bills heard before the Legislature in 2007, addressed issues in their respective commission report.

Senate Bill 1066, Relating to Invasive Species, passed into law as Act 9, SLH 2007, Special Session One, established a service fee of $1 per sea container to go toward inspections and the prevention of invasive species introduction. More inspections of all incoming goods could allow us to avoid or postpone the ingress of new pests. Evaluating this fee to determine if inspection costs are adequately recovered and providing the authority for the Board of Agriculture to set the service fee rate based on services provided will improve capacity. This bill was in line with the Governor's Economic Momentum Commission recommendations to review user fees from importers/shippers to ensure these fees are adequate to properly fund the needed prevention and quarantine programs.

Senate Bill (SB) 639, Relating to Invasive Species addressed several gaps in the authority to manage invasive plants in Hawaii. DOA is still reviewing the rules governing invasive plants and closing key gaps in the authorities that would assist in the development of more meaningful rules. The purpose of SB 639 is to improve efforts to control and eradicate noxious weeds. HISC did not take a specific position but member agencies testified in support of:

1. Requiring DOA on an annual basis to review and update the list of restricted plants requiring permits for entry into the state as necessary;
2. Requiring rather than allowing DOA to adopt rules to carry out the provisions of the Noxious Weed Control law;
3. Prohibiting the sale of noxious weeds within the state;
4. Requiring instead of allowing DOA to designate certain plant species as noxious weeds and requiring DOA to, on an annual basis, review and update the list of noxious weeds as necessary.

SB 639 passed the Senate as SB 639 SD2, and was approved in that form in the House Agriculture Committee, but was not heard by the House Finance Committee.

COUNTY INVOLVEMENT

HISC supported on the ground work and outreach by invasive species committees 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, REGULATIONS

Each member agency or HISC working group has carried out reviews of laws and regulations on an ad-hoc basis. The following is agency or working group recommendations during the reporting period:

- An interim emergency rule was proposed to DOA 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.

- The Established Pest Working Group met on March 7, 2007 to review regulations surrounding the addition or removal of invasive species to DOA's Noxious Weeds list. Members had concerns that no species have been added to the list since 1993. Meeting participants expressed concerns about the effectiveness and implementation of administrative rules under which DOA must operate and identified an update of the rules as a priority to gain extra capacity.

- DOA and DLNR did work in FY 2007 and more is planned in FY 2008 to ensure the effective implementation of §194-5, HRS, as a means for member agencies to access private property to undertake work that facilitates the prevention, control or eradication of the invasive species approved by HISC.

- DOA passed an emergency rule to prevent the movement of bees and bee products inter-island or within islands-in order to prevent the movement of the varroa mite which affects beehive health- this species is currently only known from Oahu. If spread to the Big Island, it could impact the multimillion dollar bee, queen bee, honey and pollination business in Hawaii.

WEED RISK ASSESSMENTS

One WRA Specialist was hired in 2006 and resigned to pursue other work in August of 2007. Two staff will be employed to do work on WRA in FY 2008. Extra 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 WRA Program started in April 2006 and several hundred species have been assessed to date (details are available on the website at: http://www.botany.hawaii.edu/faculty/daehler/wra/default2.htm).

- Reviewed and revised some of the criteria for screening plant species.
- Documented the search protocol for screening species.

- A guideline was set up for prioritizing the species submitted for screening. In general, screening of species that are being considered for import into Hawaii receive priority over species that are already here. And species submitted by the landscape and nursery industry groups that have signed the 'Voluntary Code of Conduct' (agreed to use the Hawaii/Pacific Weed Risk Assessment (HPWRA) before making decisions on importing plants into Hawaii) are given priority over other agencies.
- A series of one-day workshops titled 'Jumping the fence line: Escaped Agricultural Plants in Hawaii' was organized by UH-CTAHR with the goal of creating an awareness of the widespread impacts of escaped agricultural plants. HPWRA screening process was presented during this workshop as a tool that agriculturalists and rangeland managers could use for minimizing impact of invasive plants.
- Screened 125 species since April 2006. Provided technical assistance and services to the following agencies:

UH-Department of Tropical Plant and Soil Sciences

-Screened a list of 20 ornamental plants that are in use elsewhere as ornamental species. Two species turned to be high risk species – *Euphorbia amygdaloides* variety 'Efanthia' and *Lysimachia fortunei* variety supersnow.

UH-CTAHR

Several species of Eucalyptus and Acacias screened.

Maui County Planting Plan

Over 30+ species screened – actively used WRA to make planting decisions.

Oahu Invasive Species Committee (OISC)

Maui Invasive Species Committee (MISC)

Early Detection and Rapid Response Team – Bishop Museum

WRA in an integral part of plant species prioritizing efforts by the Early Detection team of Bishop Museum.

Kaulunani Urban Forestry Program of DOFAW

The Kaulunani Project actively uses WRA in making planting decisions. Recently they used WRA to select tree species that could replace the dying wilwili trees across the Islands. *Terminalia myriocarpa* (east Indian almond), *Polyalthia longifolia* var. pendula were the species screened for this purpose.

Voluntary Codes of Conduct for the nursery industry

Any agency or individual that signs the 'Voluntary Codes of Conduct' pledges to use WRA for making informed decisions before importing and undergoing large-scale propagation of plant species. As an incentive, the WRA Program gives priority to these agencies when screening species.

Hawaii Department of Transportation

Recently DOT used the WRA Program to make decisions regarding the import of *Chrysopogon zizinoides* – vetiver grass as soil binder along highways.

National Invasive Species Coordinator for the Republic of Palau

Other Pacific Islands in addition to Hawaii, are beginning to

actively use the WRA Program to make plant import and propagation and control decisions. *Paspalum notatum* cultivar 'Argentine', *Paspalum notatum* var. saurae and *Axonopus fissifolius* were recently screened on request of the Government of Palau that is considering the import of these grass species.

Lyon Arboretum and other Botanical Gardens.

The Lyon Arboretum (where the WRA program in located) is beginning to incorporate WRA into their database as well as use WRA information to help prioritize control and eradication of some of their incipient weed populations. WRA is also available to other botanical gardens for similar purposes including making informed plant import decisions. Lyon Arboretum signed on to the voluntary codes of conduct.

Individual plant growers.

The WRA Program has recently been receiving several plant information and screening requests for individual's growers on the Big Island.

- Current Workload:
  - The list of species submitted to be screened at this point is greater than 100. Kaloa farms on Big Island alone, needs over 80 palm species screened.
  - Most of the agencies and program listed above submit plant species for screening on a regular basis
- Future need.
  - Currently the WRA website is located under Dr. Daehler's webpage in the Department of Botany. As such, the website is not very accessible and user-friendly to the general public. In order to more efficiently serve the general plant industry and conservation efforts in Hawaii and other Pacific Islands, the WRA program should have its own domain on the internet (www. wra.com). This site could also incorporate or link to photos of the screened plants.
  - Currently all WRA 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 thus would be a simple first step towards assessing how WRA could better serve the conservation and nursery industry.
  - Currently only one person is doing the screening at the rate of about one species per day. Given the growing demand of species to be screened an additional screener would immensely facilitate the screening process.

HISC BUDGETARY MATTERS

Approved 2007-2008 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 FY 2008 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 voluntarily be matched (1:1) 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 HISC budget initiative as well as acknowledging the successful DOA's biosecurity initiative, service fee establishment and coqui frog control funding.

Although this budget request is administered 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 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.

HISC considered and approved the FY08 budget on July 19, 2007. The overall goals of the HISC budget are to:

- 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;

- Increase inspection and other "prevention" capabilities to prevent high-risk invasive species and diseases (e.g. brown tree snake, WNV, ballast water, ants etc.) from entry into the State, or to specific islands where they are not currently found;

- Accelerate the control of priority invasive species already present in the state (e.g. miconia, coqui frogs, marine algae, etc.) by developing a more effective state-wide early detection and rapid response capability with the Island Invasive Species Committee and other response and control efforts;

- Leverage increased involvement and expertise from private and academic sectors to assure that Hawaii has access to the most up-to-date, effective and efficient research and technology tools to combat invasive species; and

- Implement a coordinated statewide invasive species public outreach program with shared resources and responsibilities among cooperating entities.

The HISC budget is broken into four integrated components and administrative support for HISC:

1) Building up **Prevention** capabilities **$736,400 (18% of total funding)**. Projects include;
    a. $375,000 to DOH – Develop the capacity 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. $111,400 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 code of contact that includes screening plants using WRA and promoting non-invasive alternatives.
c. $30,000 to the Pacific Island Learning Network to support improvements to biosecurity measures taken in other Pacific Islands. This is expected to improve local capacity and reduce the number of pests moving between islands in cargo and will allow Hawaii to more effectively target invasive species coming from that region.
d. $50,000 for a Hawaii Ant Projects Coordinator for more effective protection of Hawaii's environment from harmful alien ants, with special emphasis on preventing inter-island spread of the little fire ant and the establishment of red imported fire ant (RIFA). In early 2007, the Hawaii Invasive Ant/RIFA prevention plan was updated. To this end, the interagency Hawaii Ant Group was resurrected in order to get input and buy in on potential plan revisions. The plan identifies the actions needed to address this threat. This will support that.
e. $75,000 for WNV and Emergent Disease Inter-agency Response Coordination implemented 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.
f. $95,000 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 data management, outreach material, training and consultation and, potentially, a remote operated vehicle to facilitate the inspection of ships.

2) Developing **Response and Control** programs **$1,754,500 (44% of total funding)** to conduct invasive species detection, response and control actions on the ground and in the water. Projects include:

a. $395,000 to DAR supervised Aquatic Invasive Species (AIS) Response Team. The AIS team will work on various alien algae management initiatives including the Supersucker project as well as continue to develop an early detection framework for aquatic alien species. In addition, the AIS team will continue to control snowflake coral infestations around Kauai and continue the eradication effort in Port Allen.
b. $1,359,500 to the Invasive Species Committees control efforts to provide early detection and rapid response to invasive species that threaten the economy and

environment of Hawaii. This includes an increase for Oahu which did not have separate funds allocated by the legislature for coqui frog control and some funds for botanists searching for incipient weed populations. The county distribution will be as follows:

Hawaii……...……..$295,000

Maui…….$370,000
City and County of Honolulu...……...… $424,500
Kauai…… $270,000

3) Enhance **Research and Applied Technology ($700,000 - 18% of total funding),** for new research and technology projects. Last year, no funds were available for research, though some previously funded projects from 2005 and 2006 are still in progress. Projects will be selected using a public notice of request for proposals, to encourage competition among providers in order to obtain the most advantageous proposal(s) that the market can support. In addition to requesting general research proposals to support invasive species management activities in Hawaii, a specific request will be made for research that leads to more effective coqui frog control.

4) **Public Outreach Program ($312,000 - 8% of total funding)** is done in cooperation with the public and private sector and targets both visitors and residents to increase voluntary compliance of quarantine laws, avoid accidental introductions of invasive species, and maintaining an effective pest hotline reporting system that delivers timely information to managers on the ground. This has been accomplished by establishing three public outreach specialist positions to carry out these tasks. A public notice of request for proposals will be made so as to repeat a successful small grant program designed to support community based public outreach that supports HISC goals. A rewrite and reprint of the CGAPS' 1996 brochure- "*The Silent Invasion*" will be partially funded by the materials budget- the remainder is to support any media projects undertaken by staff during the year. Also included is the stipend for two Americorp interns which will be matched with Americorp funds. This previously included projects from a broad array of organizations and community groups, individuals and staff.

Outreach staff, project support…..……..$189,000
Materials…….. ..……. $60,000
Requests for proposals……...…..…. $50,000
Stipends Americorp…….…… $13,000

5) **HISC Support** (**$497,100 - 12% of total funding)** includes two HISC support positions, an overhead and a fee. A 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 DLNR's Natural Area Reserve Fund. Central service fees are estimated to total $900,000 for the Natural Area Reserve Fund overall and $210,000 is the proportionate fee amount that should be paid on the $3,000,000 being allocated to the HISC Program. DOFAW overhead ($60,400) is calculated to be 2% for funds that are administered through DOFAW. HISC staff and support positions include a 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 maintain an overview of projects, provide logistical and administrative support for HISC programs and meetings, and facilitate more effective communication between members. A contingency reserve amount of 2% is proposed ($80,000) to reserve funds in the event that a statewide budget restriction is put in place. If no budget restrictions are imposed, the contingency fund will be used for: 1) Emergency response to important invasive species

problems, e.g. response to new incursions by invasive species, or 2) Funding other priority HISC projects. Expenditure of the contingency will be done after consultation and approval of the co-chairs of HISC.

DOFAW overhead……...$60,400
Central services fee…….$210,000
Staff and support……..……..….$146,700
Contingency fund……..$80,000

The budget has been aligned with both the HISC Strategic Plan and the HISC working group concerns. This assures not only compatibility with existing efforts but also accountability with specific measures of effectiveness. Lead HISC members administer specific program components and HISC working groups assure funded projects address priority issues statewide and fit into HISC members' and cooperating partners' operational programs.

HISC Budget Summary Approved for 2007-2008

		% budget	Proposed
Prevention			
	DOH - WNV	9.4%	$375,000
	DLNR - WRA	2.8%	$111,400
	PILN prevention	0.8%	$30,000
	Hawaii Ant Projects Coordinator	1.3%	$50,000
	WNV & Emergent Disease	1.9%	$75,000
	Hull Fouling & Ballast Water Projects	2.4%	$95,000
	Total Prevention	**18.6%**	**$736,400**
Response and Control			
	BIISC	7.4%	$295,000
	MISC	9.3%	$370,000
	OISC	10.6%	$424,500
	KISC	6.8%	$270,000
	AIS	9.9%	$395,000
	Total Response and Control	**44.0%**	**$1,754,500**
Research and Technology			
	RFPs coqui and general	**17.5%**	$700,000
	Total R & T		**$700,000**
Outreach			
	Staff	4.7%	$189,000
	Materials	1.5%	$60,000
	RFPs	1.3%	$50,000
	Americorp Stipends	0.3%	$13,000
	Total Outreach	**7.8%**	**$312,000**
HISC Support			
	DOFAW overhead 2%	1.5%	$60,400
	Central Services Fee fixed 7% of $3m	5.3%	$210,000
	Support Staff	3.7%	$146,700
	Contingency fund 2%	2.0%	$80,000
	Total HISC Support	12.5%	**$497,100**
Total Allocated			**$4,000,000**

Prevention

WNV - DOH	
State Laboratory Division	
RT-PCR supplies	
Mosquito pools (Oahu)	$59,000
ELISA supplies ~6240 tests (max 120/wk)	
Live birds (all islands) sera	$17,200
PPE and Lab Safety	$10,704
Consumables, lab supplies	$13,100
Preventative maintenance	$2,000
FedEx	$500
Shipping taxes	$1,496
Personnel	$99,000
Vector Control Branch	
ArcView classes	$5,000
GPS controls for truck sprayers	$32,000
Gravid trap replacement parts/ RAMP kits	$20,000
VCMS update subscription	$6,000
Computer hardware and software for Outer Islands	$25,000
Lab Supplies (entomology and microbiology)	$7,000
Larvicides	$30,000
Public Outreach	
Aloha United Way 211 (dead bird reporting hotline)	$11,500
TV, Radio PSA, website public outreach	
Invasive Species Council WNV public outreach print ads etc	$15,000
website(online bird reporting)	$1,000
Equine owner/vet WNV outreach	$1,000
printing brochures, handouts, magnets, fans etc	$2,500
Pick up of dead birds from public (ISC contracts)	$8,000
Live Bird Surveillance	
bleeding and spinning supplies for outer islands	$5,000
Shipping and courier costs of specimens to SLD	$3,000
Total	$375,000

Weed Risk Assessment	
Salaries	$72,500
Fringe	$21,800
Lyon Overhead	$2,300
Supplies	$2,000
Travel	$2,300
Subtotal:	$100,900
Indirect Costs 11%	$10,500
Total	$111,400

Hawaii Ants Projects Coordinator	
Salary	$30,000
Fringe	$9,000
Travel	$2,500
Equipment	$1,000
Supplies	$1,500
Training	$500
Utilities	
Contractual	$290
Construction	
Indirect Charges	$5,210
Total	**$50,000**

West Nile Virus and Emergent Diseases	
Salary	$45,000
Fringe	$13,500
Travel	$3,750
Equipment	$1,500
Supplies	$2,250
Training	$750
Utilities	
Contractual	$435
Construction	
Indirect Charges	$7,815
Total	**$75,000**

Pacific Island Learning Network	
Exchanges, travel costs	$14,000
Coordinator hire	$13,000
Sub-total	$27,000
*SPREP administrative costs - 10%	$3,000
Total	**$30,000**

Pacific Regional Environment Program

Ballast Water and Hull Fouling Project	
Data management	$17,000
Outreach material	$7,000
Training and consultation	$16,000
Remote operated surveillance vehicle	$55,000
Total	**$95,000**

Response and Control

AIS Team, BIISC, MISC, OISC, KISC

Total by Project	BIISC	MISC	OISC	KISC	AIS
Salary	$177,000	$222,000	$254,700	$162,000	$237,000
Fringe	$53,100	$66,600	$76,410	$48,600	$71,100
Travel and Helicopter	$14,750	$18,500	$21,225	$13,500	$19,750
Equipment					
Supplies	$14,750	$18,500	$21,225	$13,500	$19,750
Training	$2,950	$3,700	$4,245	$2,700	$3,950
Utilities					
Contractual	$1,711	$2,146	$2,462	$1,566	$2,291
Construction					
Indirect charges	$30,739	$38,554	$44,233	$28,134	$41,159
Sub-Total	**$295,000**	**$370,000**	**$424,500**	**$270,000**	**$395,000**
Total					**$1,754,500**

Research and Technology

This will be allocated via a request for research and technology proposals amounting to a total of $700,000, to support invasive species management activities in Hawaii. A specific request will be made for research that leads to more effective coqui frog control.

Outreach

Public Outreach	
Salaries	$123,200
Fringe	$37,000
Supplies	$60,000
Travel	$5,300
Subtotal:	$225,500
Indirect costs 11%	$23,500
Sub-total:	$249,000
Stipend Americorp	$13,000
Requests for proposals	$50,000
Total	**$312,000**

HISC Administration Support

HISC Support	
Salaries	$94,400
Fringe	$28,300
Supplies	$2,500
Travel	$7,600
Indirect costs 11%	$13,900
Sub-total	**$146,700**
Central service fee (7% of $3,000,000)	$210,000
DOFAW overhead 2%	$60,400
Contingency fund 2%	$80,000
Total HISC Support	**$497,100**

Distribution of HISC funds fiscal years 2005-2008

	2005		2006		2007		2008	
Working Groups	**Allocated**	**% funds**	**Allocated**	**% funds**	**Allocated**	**% funds**	**Allocated**	**% funds**
Prevention Subtotal	$1,340,000	34%	$1,516,535	38%	$410,000	21%	$736,400	18%
DOA	$943,000		$755,000		$0		$0	
DOH	$201,000		$455,135		$350,000		$375,000	
USDA/APHIS/WS	$110,000		$186,000		$0		$0	
(DLNR)	$86,000		$120,400		$60,000		$331,400	
Pacific Island Learning Network							$30,000	
Established Pests Subtotal	$1,700,000	43%	$1,560,000	39%	$1,115,000	56%	$1,754,500	44%
Aquatic Invasives (DLNR)	$300,000		$300,000		$315,000		$395,000	
Invasive Species Committees	$1,400,000		$1,260,000		$800,000		$1,359,500	
Research & Technology Grants	$600,000	15%	$600,000	15%	$0	0%	$700,000	18%
Administration and Central Services Fee	$100,000	3%	$75,000	2%	$245,000	12%	$497,100	12%
Public Outreach Subtotal	$260,000	7%	$248,465	6%	$230,000	12%	$312,000	8%
Staff & Admin. (DLNR)	$102,000		$135,465		$230,000		$262,000	
Outreach Projects (DLNR)	$158,000		$113,000		$0		$50,000	
TOTAL	$4,000,000	100%	$4,000,000	100%	$2,000,000	100%	$4,000,000	100%

APPENDIX 1 REPORT TO LEGISLATURE ON PUBLIC OUTREACH EFFORTS RELATED TO INVASIVE SPECIES

Report to the Legislature on Efficacy of Public Outreach on Invasive Species

Submitted by Christy Martin, Public Information Officer, Pacific Cooperative Studies Unit—Coordinating Group on Alien Pest Species, Honolulu, HI.

Introduction

The coordinated effort to educate the public about invasive species by the Coordinating Group on Alien Pest Species (CGAPS), the Invasive Species Committees (ISCs), and the Hawaii Invasive Species Council Public Outreach Working Group (HISC POWG) has been successful, as measured by professional public awareness surveys and other indicators.

Since 1996, CGAPS has conducted two television/print/radio media campaigns, both titled the Silent Invasion, and has taken advantage of outreach opportunities via the news media in non-campaign years. The overall goal of CGAPS outreach efforts is to raise awareness in Hawaii residents about invasive species in order to foster a sense of concern and result in supportive actions. Therefore, virtually all media buys have been aimed at the 18-55 year old demographic, for the widest possible reach.

The formation and funding of the HISC POWG has added needed capacity to the overall outreach efforts. This Group is comprised of HISC member agency public information officers (PIOs), the CGAPS PIO and the outreach staff of the ISCs, and has met every 4-6 weeks since its formation in March 2004. With an outreach staff person hired for each county, invasive species information was taken to communities via booths at public events, public presentations and contacts with local media outlets.

Outreach efficacy has been measured by CGAPS 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. Another measure of efficacy can be seen in the number of calls to the pest hotline.

The efforts and progress made by CGAPS, HISC POWG and outreach specialists spans more than ten years of concerted effort. The timeline below is provided to gain a sense of the major outreach projects and progress between 1996 and 2007. All items in bold were listed in the PSAs Spots Log for Department of Land and Natural Resources (DLNR), HISC, and CGAPS, and in most cases the type of funding support is listed.

- December 1995: Formation of CGAPS and the outreach strategy on invasive species.
- October 1996: CGAPS conducts first statewide public awareness survey on invasive species.
- 1997-98: CGAPS conducts first Silent Invasion media campaign with television public service announcements (PSAs) and a 26-page printed booklet distributed to school classes, legislators and community leaders. Private and contributed funds.
- August 2002: CGAPS public information officer hired to evaluate strategy and promote awareness of invasive species. Federal funds.
- November 2003: CGAPS conducts focus groups using Ward Research to explore public sentiment and new awareness campaign ideas. The Hawaii Department of Agriculture (HDOA) pest hotline is identified as a major problem area by focus group participants. Federal funds.

- 2004 – 2005: CGAPS and partner agencies address concerns by researching, planning a new toll-free statewide pest hotline for HDOA. CGAPS plans five new Silent Invasion campaign messages, secures funding from multiple sources.
- March 2004: HISC POWG forms and meets for the first time to plan strategy and coordinate efforts.
- April – August 2004: CGAPS and ISCs produce and air radio ads to garner reports on coqui frog locations in Kauai, Oahu and Maui Counties. HISC funds and private contributions.
- August 2004: CGAPS conducts baseline public awareness survey (Ward Research) in preparation for the second Silent Invasion media campaign. Federal funds.
- **May – September 2005: HISC funded coqui frog radio PSAs to gain reports on Kauai and Oahu.**
- **October 2005: Miconia vignettes on "Outside Hawaii." HISC funded production costs.**
- December 2005: HDOA begins using new, toll free statewide pest hotline goes online, 643-PEST, and modifies the INVICTA pest interception database to add a hotline call report and tracking section. HISC funded the new hotline.
- **January – April & May – July 2006: CGAPS airs five Silent Invasion television PSAs using state and federal funds. Federal and state funding for broadcast (see list under Acknowledgements).**
- **April – May 2006: Coqui vignettes on "Outside Hawaii." HISC funded production costs.**
- June 2006: CGAPS conducts a benchmark public awareness survey (Ward Research) to gauge changes in awareness and plan the most effective method of utilizing remaining resources. Federal funds.
- **May 15 – June 15, 2006: Invasive alien algae and Supersucker vignettes on "Outside Hawaii." HISC funded production costs.**
- November 2006: CGAPS and POWG produce a radio PSA utilizing Frank DeLima singing a jingle about the pest hotline to promote awareness and aid in memory retention. HISC funded production cost.
- February 2007: CGAPS and POWG conduct benchmark public awareness survey (Qmark Research and Polling). HISC funded survey cost.
- **February – April 2007: HISC airs pest hotline jingle on radio stations statewide. HISC funded broadcast cost**.
- **March 2007: CGAPS airs Silent Invasion "Report a Pest: Snakes" PSA on television. Federal funding.**
- **March 2007: HISC and ISCs air coqui frog pest hotline PSA on Kauai and Oahu radio stations. HISC funded broadcast time, private contribution for production costs and Maui broadcast time.**

Measures of Efficacy

All surveys and focus group work was conducted by professional survey companies. Survey participants were registered voters interviewed by telephone in a random sample, balanced according to all known demographic factors, for a margin of error of +/- 4% at a 95% confidence level. For full reports on the 1996, 2004, 2006, and 2007 statewide public awareness telephone surveys, and the 2004 Focus Groups Summary, please contact Christy Martin at CGAPS, christym@rocketmail.com (808) 722-0995. Reports from HDOA regarding snake sightings were furnished by Keevin Minami and Darcy Oishi of HDOA.

1. Public awareness of the concept is rising. Survey results show that public awareness has risen over the past eleven years of concerted efforts, particularly after television, radio and print campaigns.

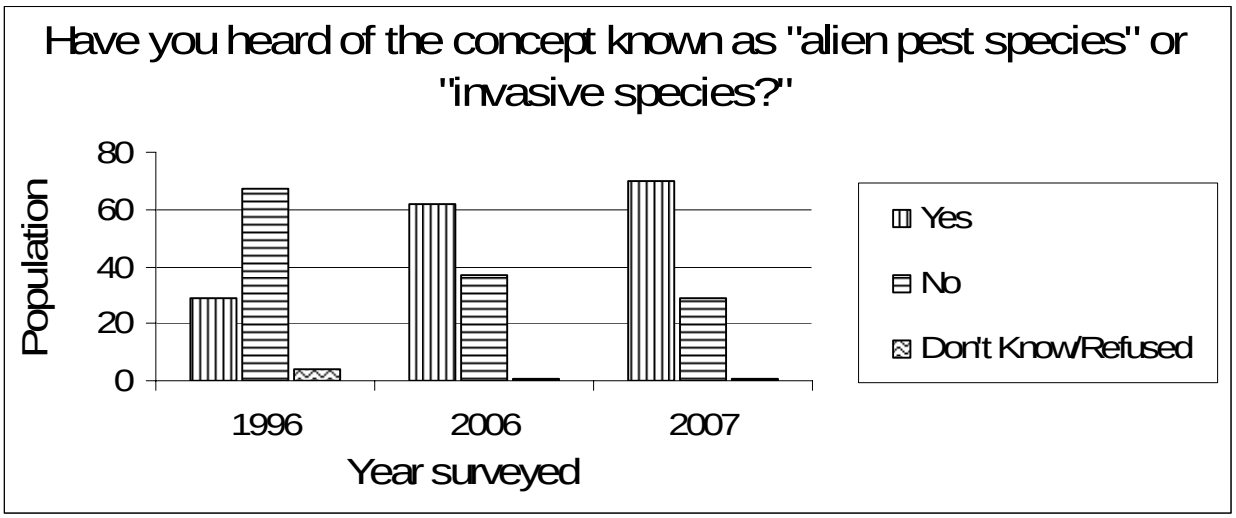


Figure 1. General concept awareness started at 29% of people that said that they had heard of the concept of invasive species in 1996, to 62% in 2006, and 70% in 2007.

2. The number of people that view invasive species as a serious problem is rising. Ongoing efforts to convey the threat and costs of invasive species such as snakes, red imported fire ants, invasive seaweeds, and miconia to the public is working.

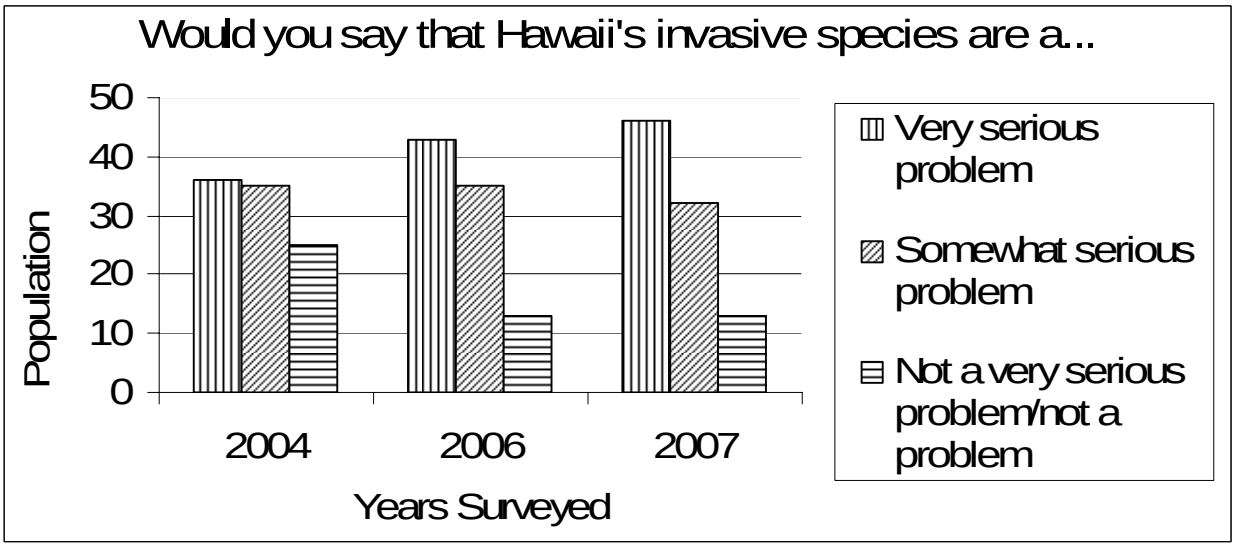


Figure 2. In 2004, prior to the second Silent Invasion television campaign, 36% of survey participants thought of invasive species as a "very serious problem." After airing the television PSAs, radio ads and other outreach, 43% of participants in 2006, and 46% in 2007, felt that it was a very serious problem. Also, the number of people that don't view invasive species as a problem has decreased.

3. Awareness of key "poster species" is rising. One of the outreach topics that CGAPS has focused on since 1996 is the brown treesnake (*Boiga irregularis*), and the threat that these and other snakes pose to Hawaii. Working together with the HISC POWG, the key messages for the public are that:

1. Snakes are bad for Hawaii;
2. Snakes are illegal to import or own;
3. If you see a snake, call HDOA pest hotline immediately to report it;
4. People with illegal pet snakes should take advantage of the amnesty program by calling the pest hotline to surrender snakes without fear of prosecution.

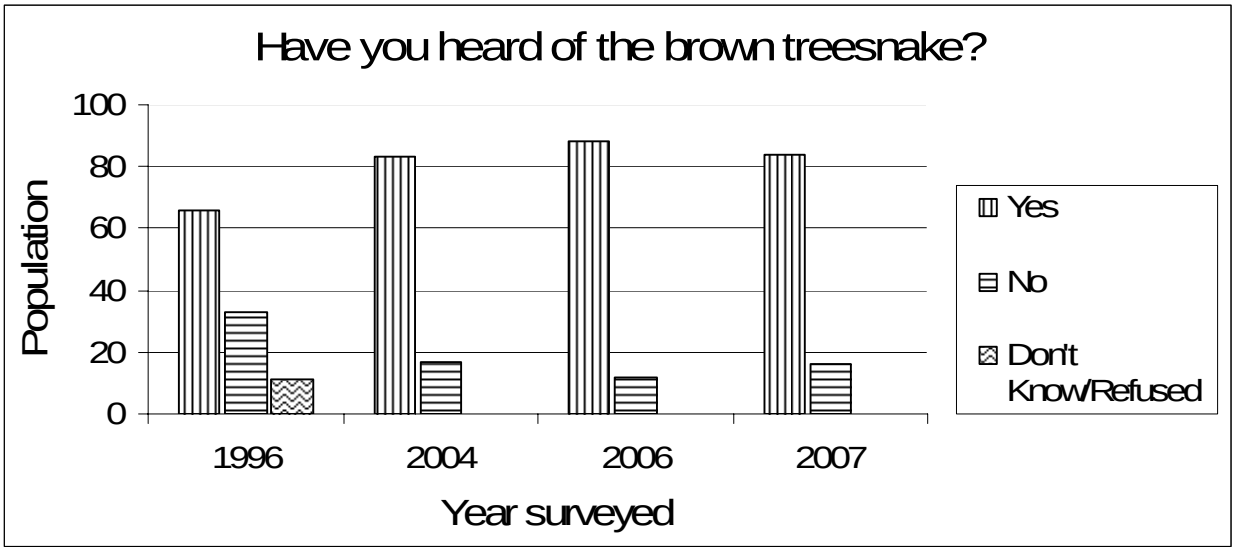


Figure 3. Public awareness of brown treesnakes started at 66% in 1996, increased to 83% in 2004, 88% in 2006, and in 2007 a slight (but not statistically significant) decrease to 84% saying that they had heard of the brown treesnake (Figure 3).

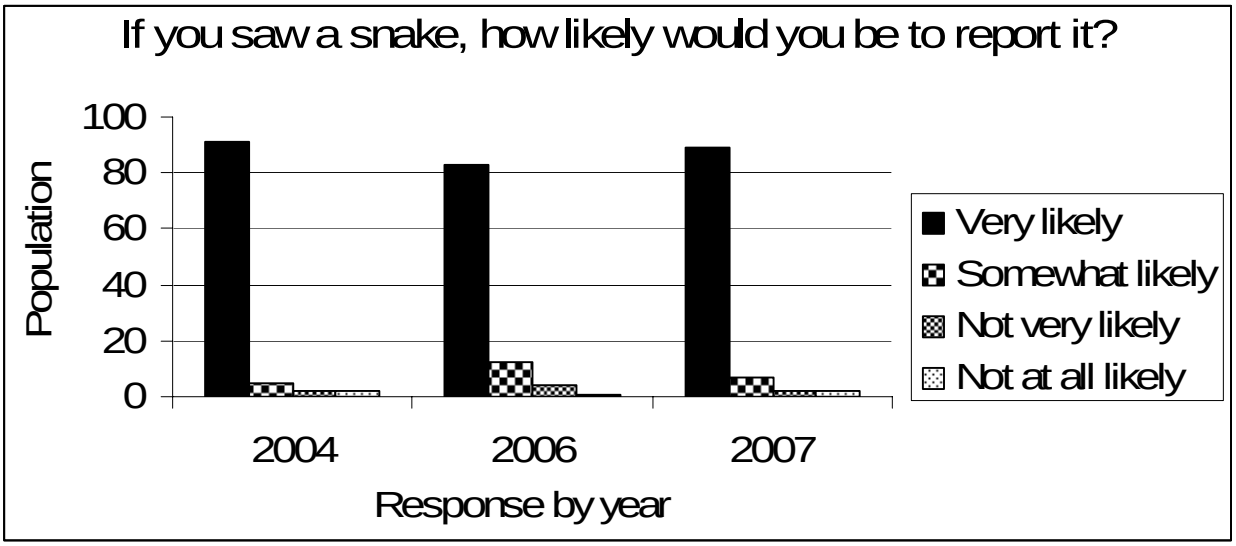


Figure 4. When asked how likely they would be to report a snake sighting, the public continues to be very motivated. A slight dip in the number of people that are "very likely" to report a snake

in 2006 was part of the motivation for adding more television time for the snake PSA in 2007, and for highlighting snakes via other outreach methods.

4. Public awareness of the other key species has also increased with television and radio exposure. Species (besides brown treesnakes & other snakes) that outreach efforts have focused on include West Nile Virus, Red Imported Fire Ant, coqui frogs, miconia, invasive seaweed, and snowflake coral. Table 1.

Although included in the survey, *Salvinia molesta*, the floating water fern that covered Lake Wilson, Oahu in 2003 was NOT part of outreach efforts. It was included in surveys because it was mentioned more than 600 times in newspapers and on the television news for countless other times, for almost three months straight. With this sort of media attention, one would expect to see higher public awareness, but this is not the case. This provides some evidence that a multi-faceted media campaign in addition to using the news media is absolutely necessary for keeping invasive species issues in the minds of the public and decision makers.

Have you heard of…	Response	2004 (Percent)	2006 (Percent)	2007 (Percent)
West Nile Virus	Yes	83	85	80
	No	17	15	19
	Don't know	0	0	1
Red Imported Fire Ant (RIFA)	Yes	69	75	71
	No	31	25	28
	Don't know	0	0	1
Coqui Frog	Yes	69	82	86
	No	31	18	14
	Don't know	0	0	0
Miconia	Yes	47	50	58
	No	53	49	40
	Don't know	0	1	2
Invasive Seaweed	Yes	46	55	49
	No	54	44	50
	Don't know	0	1	1
Snowflake coral*	Yes	26	26	26
	No	74	74	72
	Don't know	0	0	2
Salvinia**	Yes	38	35	32
	No	61	64	64
	Don't know	0	0	4

Table 1. Public awareness of the red imported fire ant peaked during the airing of the Silent Invasion television PSAs in 2006, and invasive seaweeds also peaked during this time, which

coincides with the invasive seaweed and Supersucker vignettes on Outside Hawaii in 2005. Awareness about miconia is still low in general, but continues to rise. Awareness of West Nile Virus peaked in 2006, perhaps coinciding with outreach efforts and media attention on the bird that tested a false-positive on Maui that year, and coqui frog awareness has risen, probably through a combination of the radio ads, the Outside Hawaii vignette and the exploding Hawaii Island population.

**Note that snowflake coral was mentioned very briefly in one of the television PSAs, and very few news media stories were done on this species in 2004 and 2005.*
***Also note that Salvinia was not part of the outreach campaign between 2004 and 2007, and awareness is declining each year since the 2003 infestation of Lake Wilson.*

5. Pest Hotline awareness is slowly rising. The 586-PEST pest hotline number has been in operation since 1992, yet there was very low awareness of the existence of the hotline, the actual number to dial, or even the agency and department where pests could be reported.

In addition, the 2004 focus group study by Ward Research on behalf of CGAPS found that neighbor island residents were opposed to calling the number, which is based on Oahu. Calls from outside of Oahu are long distance, and callers would be charged long distance tolls, even if they were reporting important invasive species such as snakes. The new 643-PEST hotline was set up in December 2005, and is functioning in addition to the 586-PEST number (since many HDOA printed materials still referred to this number). Table 2.

Whom would you call to report a snake?	**2004 (Percent)**	**2006 (Percent)**	**2007 (Percent)**
586-PEST	5*	1	6
643-PEST (est. 12/05)	(N/A)	0	6
HDOA (no branch or office mentioned)	18	18	17
Pest Hotline (no number mentioned)	0	3	2
Humane Society/Animal Control	29	27	21
Police/911	27	30	38
DLNR	6	8	5
I would look in the phone book	2	7	10
State Department of Health	6	5	3
Zoo	2	2	1
University of Hawaii	2	2	2
Friends/Family	2	2	2
Other (Fire, USDA, etc.)	18	7	12
Don't know/Refused	7	14	0

Table 2. When asked, "Whom would you call to report a snake," respondents replied with one or more of the answers above (therefore totals may exceed 100%). Outreach efforts on the new pest hotline number, 643-PEST, is having some effect, particularly with radio outreach efforts via the

new hotline jingle by Frank DeLima, and the fact that coqui ads in 2007 used 643-PEST instead of local office numbers.

** Note that in 2004, survey respondents that were able to recite the 586-PEST number, or stated "pest hotline" as the place to call were lumped together, adding up to 5%. These responses were separated in subsequent surveys for planning purposes.*

6. Public use of 643-PEST is rising. Although Hawaiian Telcom (the provider of the 643-PEST number and service) was supposed to provide monthly reports on number of calls since that time, data and billing issues within Hawaiian Telcom prevented these reports from being generated. The first report received was for March 2006, with reports not generated (and Hawaiian Telcom unable to furnish any data) until December 2006. Table 3.

643-PEST Call Report	Number of Calls
Mar-06	26
Dec-06	17
Feb-07	69
Mar-07	234
Apr-07	284
May-07	123
Jun-07	147
Jul-07	118

Table 3. Use of the 643-PEST hotline rose during radio outreach on the pest hotline (coqui PSAs and the Frank DeLima jingle).

7. Snake sighting reports, from information logged in the INVICTA database, shows that snake reports increased during media outreach periods, particularly the television Silent Invasion messages in January – July 2006.

The sightings investigated by HDOA total 33 calls since December 2005, with the recovery of 2 live snakes, 1 snake skin, 3 sea snakes, and 4 "blind snakes" (the non-native worm-like blind snake that lives in the soil, erroneously called the "Hawaiian blind snake." This is the only known snake to have become naturalized in Hawaii). Figure 5.

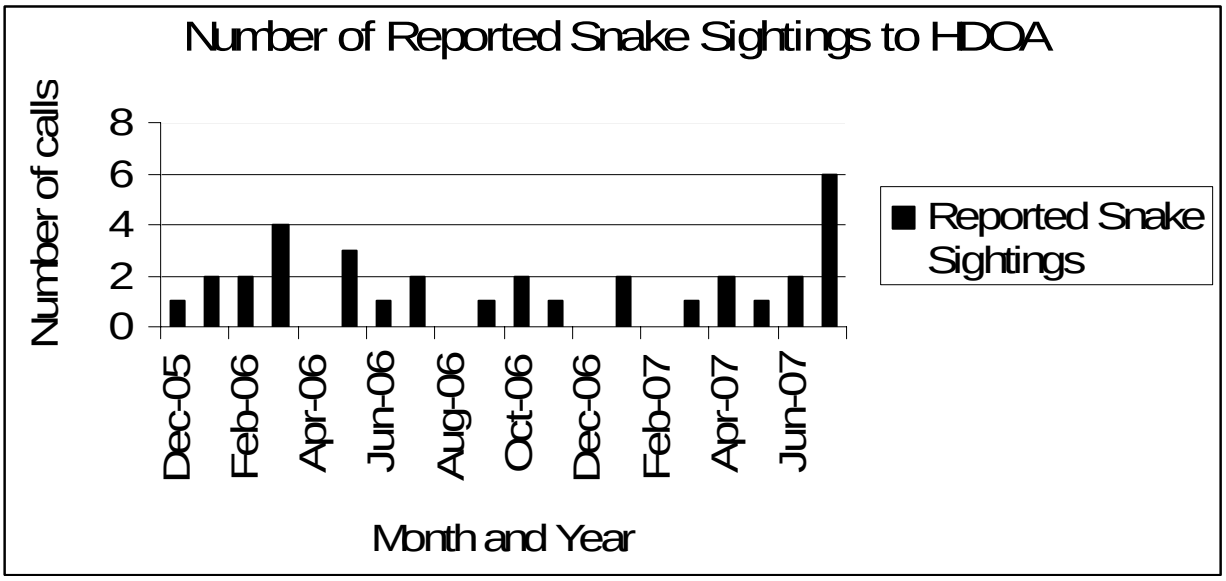


Figure 5. Although the number of snakes present in Hawaii should not fluctuate (indeed, they should theoretically be "0"), the number of people calling to report snakes rose during the airing of the television Silent Invasion PSAs between January and July 2006. It is unknown why there are more snake reports in July 2007, although this pattern may be similar to previous years (there may be more outdoor activity, etc., accounting for the rise).

Discussion

The results of the public awareness surveys and pest hotline reports reflect the success of concerted outreach efforts using short-term media campaigns, opportunistic news media stories, and other techniques. Survey results also highlight the challenges of educating the public and fostering desired actions, particularly when different messages require multiple delivery methods. Careful planning and testing of messages with focus groups have helped to ensure that messages are appropriate, but there may be no way to ensure that we are selecting the right outreach method for the message and audience until the campaign is underway. Benchmark surveys are therefore important to help determine if our messages are sticking.

As a side note, there continues to be significant concern about snake sightings. For a state that has made the importation and keeping of snakes and other harmful reptiles illegal, there continues to be an unacceptable number of snakes that show up in Hawaii. Between 1990 and 2000, HDOA reports that there were 236 credible snake sightings, and 137 snakes captured or received via the amnesty program, the vast majority of these were pet-trade species of snakes such as boa constrictors and pythons. This means that there is a subset of the public that willfully engages in smuggling, and our outreach efforts have not worked on them. Indeed, there is another message that has been received and spread among this group—although there are penalties, it is relatively easy and safe to smuggle snakes into Hawaii (Kraus and Cravalho, 2001). This issue must be addressed, or this unintended message will continue to spread amongst that portion of the population that does not view it as a serious issue. Furthermore, repeated snake sightings and news of snakes found roaming free or turned in to the amnesty program may have a negative effect on the currently supportive public.

Also, the plant importation laws virtually ensure that new invasive plants will be introduced via the nursery and ornamental trade. Outreach efforts cannot keep up with the multitude of new invasive plants being distributed, and it is unreasonable to view outreach as a viable option for detecting or controlling the next miconia or fountain grass. The only thing that wide scale public outreach can do in this regard, is to let the public know that new invasive plants are still being sold, and that they should ASK for non-invasive or native plants. Outreach will also continue on key invasive plants such as miconia, since the airing of the first Silent Invasion PSAs in 1997 resulted in the reporting of a new miconia population on Kauai.

Acknowledgements

Funding received for outreach efforts since 2002 is gratefully acknowledged. The Department of the Interior-Office of Insular Affairs, Hawaii DLNR's-Division of Forestry and Wildlife and Division of Aquatic Resources, HISC, Hawaii Tourism Authority-Natural Resources Program, National Oceanic and Atmospheric Administration, United States Fish and Wildlife Service, and the Pacific Cooperative Studies Unit, have each supported portions of these outreach activities.

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APPENDIX 2 PUBLIC SERVICE ANNOUNCEMENTS INVASIVE SPECIES OUTREACH

Alien pests are real bad news, if they get here then we all lose.

So stay alert, keep Hawaii pest-free, call 643-PEST.

Snakes, Fire ants, killer bees, piranhas…We don't want pests like these in paradise.
So if you see a snake, or other suspicious creature, you know who to call.
Keep Hawaii pest-free, for you and me, call 643-PEST. That's 643-PEST

Frank DeLima, February 2007

CGAPS Silent Invasion 2007 Television Public Service Announcements
(Sponsored by Earthlink and KITV)

PSA 1: Invasive Species harm Agriculture
Announcer Voiceover: *Invasive species are non-native animals, plants, insects and even diseases that can enter Hawaii, harm us, and the agricultural industry.*

Dean Okimoto (Owner & Farmer, Nalo Farms): *Invasive pests can damage or even destroy crops.*

Dean continues: *Agriculture is critical to Hawaii's economy and security…and for farmers, it's our livelihood."*

Announcer Voiceover: *Please, help protect Hawaii. When you return home, declare all produce and plants for inspection. Most items will be returned to you.*

PSA 2: Invasive Species harm the Visitor Industry
Announcer Voiceover: *Invasive species are non-native animals, plants, insects and even diseases that can enter Hawaii, harm us, and our visitor industry.*

Ted Bush (Beachboy & Owner, Waikiki Beach Service): *People come to Hawaii because of our environment.*

Ted continues: *Can you imagine what this beach would look like if we had biting sand flies?*

Jan Abalos (Sheraton Waikiki Guest Services): *Our livelihood is at stake, and so is our quality of life.*

Announcer Voiceover: *Please, help protect Hawaii by following all import laws.*

PSA 3: Invasive Species harm public health
Announcer Voiceover: *Invasive species are non-native animals, plants, insects and even diseases that can enter Hawaii and cause us harm…no matter where we are.*

Dr. Cris Ancog (Pediatrician): "*We're lucky—Hawaii doesn't have West Nile Virus or bird flu…yet. But the these diseases could arrive.*

Cris continues: *Finding a dead bird could mean that a disease is present, so please help by calling 211 immediately to report it for testing.*"

PSA 4: Invasive species like snakes cause harm
Announcer Voiceover: *Invasive species are non-native animals, plants, insects and even diseases that can enter Hawaii and cause us harm*

Gary Sprinkle (KITV News at 5 Anchor & Journalist): *The damage the brown treesnakes has done on Guam is devastating: loss of the birds, costly power outages, infants bitten in their cribs…The same thing can happen here …**any** snake is a problem.*

Gary: *Protect Hawaii. Report all snake sightings immediately to 643-PEST.*

PSA 5: Invasive plants harm the watershed
Announcer Voiceover: *Invasive species are non-native animals, plants, insects and even diseases that can enter Hawaii, harm us, and our watershed.*

Heidi Bornhorst (horticulturist and arborist): *What we plant in our yards can impact the forest.*

Heidi continues: *Take miconia. It was planted in a garden in 1961—now, it dominates thousands of acres of watershed forest. New invasive plants are still being sold, so please—ASK for native or non-invasive plants.*

Kauai Outreach Coqui Prevention and Early Detection

Aired the PSA's on Kaua'i from 3/26/2007-4/06/2007

V1….*Do you hear that sound? It's hundreds of coqui frogs calling out in the middle of the night….*

V2…*We're two members of the local field crews that are working hard day and night to protect you from hearing this in your backyard….*

V1…*We want to protect our peaceful lifestyle by making kaua'i coqui-free. But we need your kokua…*

V2.. *New frogs may accidentally arrive on the island. If you hear a coqui frog, call 643-PEST immediately…*

V1… *Together we can make our island coqui-free…*

V2… *CALL 643-PEST…THAT'S 643-7378*

APPENDIX 3 [CHAPTER 194 INVASIVE SPECIES COUNCIL]

Section

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;

(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 multidepartmental 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]

APPENDIX 4 [DRAFT MINUTES HAWAII INVASIVE SPECIES COUNCIL]

HAWAII INVASIVE SPECIES COUNCIL
PLANT QUARANTINE CONFERENCE ROOM
HAWAII DEPARTMENT OF AGRICULTURE
JULY 19, 2007
2:00 P.M. – 4:00 P.M.

DRAFT MINUTES

CALL TO ORDER

Co-Chair Allan Smith called the meeting of the Hawaii Invasive Species Council to order at 2:12 p.m. The following were in attendance:

MEMBERS:

Ms. Sandra Kunimoto, DOA
Mr. Allan Smith, DLNR
Mr. Francis Paul Keeno, DOT
Mr. Laurence Lau, DOH
Mr. Sam Callejo, UH
Ms. Liz Corbin, DBEDT

AGENCY AND LEGISLATIVE REPRESENTATIVES:

Mr. Matthew Goo, USDA

OTHERS:

Mr. Chris Buddenhagen, HISC
Mr. Mike Pitzler, USDA-WS
Mr. Joshua Fisher, USFWS
Ms. Miranda Smith, KMWP
Mr. Paul Conry, DLNR/HISC
Mr. Mark Fox, Nature Conservancy
Ms. Christy Martin, CGAPS
Ms. Lori Buchanan, MOMISC
Dr. Arlene Buchholz, DOH
Mr. Greg Olmsted, DOH
Ms. Priscilla Billig, HISC
Mr. Rob Hauff, DOFAW
Dr. Lyle Wong, DOA
Mr. Domingo Cravalho, DOA
Mr. Michael Buck, none
Mr. Darcy Oishi, DOA
Dr. Neil Reimer, DOA
Ms. Katie Swift, USFWS
Ms. Shahin Ansari, Lyon Aboretum
Ms. Karmin Kine, DLNR/HISC
Dr. Mindy Wilkinson, DLNR
Ms. Julie Leialoha, BIISC
Ms. Teya Pennimen, MISC
Ms. Maile Sakamoto, DOH
Mr. Erick Cremer, DOH
Ms. Sara Pelleteri, DAR
Ms. Carol Okada, DOA
Ms. Leslie Iseke, DOA
Ms. Pam Matsukawa, DAG
Ms. Jackie Kozak

APPROVAL OF MINUTES FROM JULY 18, 2006

{Note: language for deletion is [bracketed], new/added is underlined}

The following amendments were made to the minutes:

1. Page 1
"Members
Ms. Liz Corbin, DBEDT

Others
[Ms. Liz Corbin, DBEDT]

1. Page 4, Item 4 – Line 3

   (UH) – "…take a new look at how [to] things (i.e. applying for federal aid) [was] were being handled."

2. Page 5, Item 4 – Last paragraph, last line

   (UH) – "…(frogs, fire ants) so that's [were] where they're sending the manpower."

3. Page 5, Item 5 – Under "Prevention" – Line 12

   (UH) – "…birds including birds, doves, pigeons, and chickens which are species that would not die from the West Nile Virus."

4. Page 4, Item 4, last paragraph, second sentence from bottom of page

   Lyle Wong – "…design a [larger type of unit] large hot water treatment unit which will be placed [at Honolulu Airport.] at State Plant Quarantine."

5. Page 5, Item 4, first paragraph, third line

   Lyle Wong – "…which allowed DOA to [construct] purchase the unit, 1 steam sterilizer, 3 sprayers and the ability to complete the survey."

Unanimously approved as amended (Corbin/Callejo)

HISC MANAGEMENT AND PROGRAM REVIEW

Co-Chair Sandra Kunimoto welcomed everyone back since the last HISC meeting about a year ago. She thanked staff leadership, including Mindy and Chris and their staff, for working hard throughout the Legislative session to be sure that funding continued. She said that this year we received full funding as compared to half the amount of funding last year and also mentioned that Lyle and his staff obtained additional funding directly into the HDOA budget. She said that everyone needed to look forward and seriously look into proposing funding for departmental budgets for those programs/projects that were originally HISC funded but need to go beyond the trial stage for a longer term.

UPDATE STRATEGIC PLAN REVIEW AND FUNDING PRIORITIES

Paul Conry, Administrator, Division of Forestry and Wildlife, said they propose to review and update the Strategic Plan that was prepared about four years ago within the next six months. One of the main goals is to better coordinate the activities of the ISC groups from information and experience gathered over the past four years and incorporate those activities into the Strategic Plan. He said to speed up the process, staff has begun the review process and will disseminate the draft to the working groups for their review and input. He said they are looking into other strategic initiatives for incorporation into the plan and be able to implement and how best to utilize our funds to achieve the goals and objectives for the next four years. The goal is to get a better road map of where we want to go over the next four years, with coordinated efforts across agencies, priority actions that can be implemented and achieved. The existing budget of 4 million

is a small part of the resources needed to achieve the goals and objectives that the program has. Input from the working groups and agencies, will target how we can be utilize the available funds. What is the overall mix for funding for the major categories of work, prevention, control and eradication, research and technology. This will be an opportunity to weight the balance of the different operations that we have out there. There is need for two elements of response for invasive species, one that is provided by the invasive species with early detection and eradicate, and a second for the control of established pest through biological control. Biological control is mentioned in the plan but without any specific details. Another concern is how to incorporate aquatic resources which is now a small part of the overall program. The review of the strategic plan will take place over the next six months in an effort to come up with a strategic plan that can guide the HISC over the next four years.

Lyle Wong, Administrator, Plant Industry Division, said over the past several weeks the HDOA has been in discussion with DLNR regarding HISC and the strategic plan which we believe has served HISC well over the past four years, but clearly should be update at this point in time. This discussion has developed in part because of questions from the chairperson, BOA, regarding how well are we partnering with the members of HISC and are we accomplishing what we are hoping to accomplish. Dr. Wong suggested that the reality within the HDOA is that the department has been focused on the self interest to develop program capacity to best implement core responsibilities, for Plant Quarantine, pest prevention, with available resources and how well are we planning for new program initiatives as new resources become available. The chair's focus has been on how do we more effectively engage in the process, within the HDOA and with HISC. Therein, the focus in house has been on program priorities at the same time not loosing any opportunities with respect to HISC on what HISC is trying to do. Dr. Wong suggested that a good first step would be to have meetings with DLNR and have dialog with the membership on a more regular basis. The sense is that the various initiatives of concern within the HDOA need not be all funded by HISC, but should be supported by HISC as other sources of funding are sought from federal and other agencies. HDOA wants to further expand the department's biosecurity programs, State Plant Quarantine was fortunate to expand its program from 62 to almost 105 positions, clearly this will not be enough, but it's an addition to be optimistic that we can expand capacity and develop program to address and mitigate specific risk. The HDOA was to expand the department's biocontrol capacity and this has been discussed with DLNR. The feeling within the HDOA is that biocontrol is a program area that fits within the Established Pest Working Group scope, but that HISC would not have the kind of funding needed to along expand the capacity of the HDOA's program so the HDOA much look to other funding sources, including the legislature and federal agencies. Further, it is the HDOA interest to further expand the research capacity in Hawaii to address pest problems through partnerships with other agencies, including the USDA-ARS, Pacific Basin Agricultural Research Center, the University of Hawaii-Hilo, and the University of Hawaii-Manoa, College of Tropical Agriculture and Human Resources, Fish and Wildlife, and the USDA- Wildlife Services. There are opportunities to have alliances with these organizations. Hawaii is the research capital of the world for fruit flies, and 95% or more of the technologies for the control of fruit flies have been developed and/or have origin in Hawaii but for social insects the expertise and technology development has been fairly marginal, but we have an opportunity to expand this capacity as well. The needs of the respective agencies may not necessarily be aligned on the best actions to be taken, so it's important for the agencies to get together to discuss our respective priorities, and this should be under the umbrella of HISC to the extent that we can. HDOA and DLNR has also discussed emergency planning. With new pests

entering Hawaii, there is a need to put aside some funds for emergency projects and to allocate these funds at the appropriate time in the course of the year to programs to assure that no funds lapse at the end of the year should no specific needs arise for the emergency funds for new pests.

WORKING GROUP UPDATES

Public Outreach

Maile Sakamoto, Chair, started with a slide that she has found useful in her presentations on how to best reach out to the community on the issues. She noted that an important factor is to have outreach specialists within the Island Invasive Species Committees to address individual program priorities and needs. The ISC are fully staffed, with outreach personnel as follows:

Statewide Coordination HISC: Priscilla Billig
Oahu Invasive Species Committee: Rachel Neville
Maui Invasive Species Committee: Joylynn Paman
Big island Invasive Species Committee: Diana Greenough
Kauai Invasive Species Committee: Jackie Kozak
Coordinating Group on Invasive Species: Christy Martin

The Public Outreach group met five times last year. While funding has been stable, the level of funding has been flat and public outreach costs are high for media coverage and time. A strategic plan has been development by the public outreach group which will be implemented this year. Public outreach will implement a small grant program to communities to support individual community efforts for public outreach and will be supporting several Americorp interns this year. Public outreach hopes to come in with a large budget next year to support additional new initiatives. Funding has been in the range of 230K, which is very small compared to the budget of other working groups. While the strategic plan was not handed out, Maile Sakamoto explained the major components of the plan which includes, goals and objectives, priority emphasis, methodologies, specific actions to be taken, and measures of effectiveness.

Pest hotline, new letters, brochures, and children's fair, were highlighted as major projects of the past year.

Prevention

Carol Okada, Chair and Program Manager, State Plant Quarantine reported that the group met once this past year to review the status of projects. The meeting was chaired by Domingo Cravalho of PQ.

DNLR Aquatic Resources has been working to develop a ballast water program to prevent the movement of marine invasive species through the ballast water systems of ships entering Hawaii.

USDA, Wildlife Services has been working on programs to prevent the movement of the brown tree snake into Hawaii. We had a scare this year when it was thought that the programs would lose federal assistance in inspecting flights leaving Guam for the BTS. The Office of Insular

Affairs Support provides support to HDOA for the inspection of flight with the funds used primarily for the over to cover Guam flights arriving in Hawaii.

Carol Okada provided an update on the HDOA biosecurity program, additional funding from the legislature has been received to added 56 new positions to the program to enhance prevent/inspectional activities. The goal is to prevent pest entry as well as to help promote agriculture. Program development is occurring through several different phases, with the first being the filing of new staff positions through the Legislative appropriation. The program has only one diagnostician and efforts are underway to expand the diagnostic capacity of the program with additional staff as well as through linkages with other agencies, including the California Department of Food and Agriculture. The legislative appropriation of 2.9 million including approximately 2.5 million for additional staff and .5 million for additional operating program funds. These funds allow the program to reinstate inspectional program activities dropped over the past 10 – 12 years as a result of funding cut-backs. One of these activities was rapid response. Prior to the biosecurity funding, program staff was not able to travel interisland to provide assistance to outer island staff when pests were detected. Each investigation costs in the range of $5,000.

Carol Okada described various other projects funded by Hawaii Department of Transportation for Kahului Airport under the Alien Species Action Plan for airport improvements, including, airport informational displays. Biological surveys around the airport are being conducted by Bishop Museum.

Regarding diagnostics, Carol Okada indicated the Department of Agriculture not does have a botanist on staff; State Plant Quarantine has only one identifier at the present time for insects. This is a problem since for PQ to take regulatory action, the pest of concern must be identified.

Carol Okada gave an update on the filling of staff positions on the various islands. Kona, Kauai and Maui still have vacant position as no qualified candidates applied for the positions. Hilo and Oahu positions have a few vacant positions as a result of recent retirements; these will be filled as many eligible candidates have applied for available positions for the respective ports.

For Maui, we are finding that applicants from Maui are missing required courses and/or a four year degree.

Four Department of Interior funded inspector positions were not filled to provide personnel saving to cover canine handlers' overtime for the inspection of Guam flights that arrive in Hawaii at all hours of the day.

Carol Okada also pointed out what happens when new inspectors are brought into the program. Total inspections are going up for both air and ship cargo. However, when new pest arrive or are of concern, the redirecting of staff to the priority concern (e.g., the varroa mite or the light brown apple moth) results in a decrease in staff time at the ports with a reduction in inspection capacity.

Carol Okada gave a brief update on the development of the Invicta database system for State Plant Quarantine. FAA stared funding the program development in 2002. The database at the time was available solely for the Kahalui Airport under the Record of Agreement by FAA to the

airport Environmental Impact Statement. In 2004, the database went through further development. In 2005-06, HISC provided $300,000 for the further expansion of the Invicta Database System for statewide application.

Carol Okada gave a brief review of the Invicta system, including, data fields on flights, carriers, passengers, inspections, cargo and interceptions; organisms detected and identified; permit data and reports that can be generated from the database.

Ms. Okada showed a number of slides of the new Alien Species Inspection Facility at Kahului Airport, which is targeted for completion in October or November of this year. The facility will hold three agencies, State PQ, USDA-APHIS-PPQ, and Homeland Security, Customs and Border Protection. The facility has three inspection bays that are fully enclosed to contain cargo if pests are detected. A joint-use facility is being planned for Honolulu International Airport and a team from State PQ will visit federal plant inspection stations in Miami, Houston and Los Angeles shortly as part of the planning process for this facility.

Other collaborative efforts were mentioned. State PQ worked with the Taiwan Plant Quarantine Ministry to assure the safe movement of potted orchids from Taiwan to a nursery in Hawaii. A pathway risk assessment is being finalized with USDA-APHIS-PPQ for domestic and foreign flight, passengers, and cargo arriving in Hawaii. The report will include recommendations on how state and federal quarantine programs can better work together to reduce pest risks.

Regarding the coqui frog, a program is being developed for the construction and cost sharing of thermal heat treatment units on the Island of Hawaii. HDOA has further entered into a contract with the University of Hawaii College of Tropical Agriculture and Human Resources to build a hot water treatment unit, which will be located on the Island of Hawaii

Ms. Okada gave the committee a brief description of technologies observed in Taiwan for red imported fire ant control to track pesticide application using GIS on tractor spray rigs that we hope to employ in Hawaii in large area wide pest control programs.

Established Pests

Teya Pennimen, Manager of the Maui Invasive Species Committee, speaking on behalf of this group, gave an update on the aquatic invasive species program.
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Teya Pennimen gave an update on the aquatic invasive species program. She noted that the work is a pioneering effort and is achieving national recognition. She said that it is in its third year and that more resources need to be added to this project.

She said that the aquatic invasive species group is working across the state to survey for invasive species and that the eradication of aquatic species is hard to do. She mentioned that a mushroom anemone has been successfully eradicated. Also mentioned was a super sucker that is being used to suck up alien algae at several hundreds pounds per hour. She said the group is also doing hull inspections of all research vessels before they go to the Northwest Hawaiian Islands to be sure they are not transporting invasive organisms.

Ms. Pennimen said that ISC is particularly good in focusing limited resources on the most effective strategy. As an example, she mentioned that a widespread invasive species such as Miconia on the Big Island can't be taken on all a one time, so they locate the outlying populations and work on controlling them. She said in 2006 BIISC controlled over 1,300 mature plants and surveyed over 12,000 acres. She also mentioned that miconia is under control on Oahu and Kauai, with smaller populations on Maui but is over large areas on the Island of Hawaii. She said that surveys are continuing on Molokai where it has not been detected.

Regarding the coqui frog, Ms. Pennimen reported that a large area on Maui in Maliko gulch is infested. Plans are in place to initiate some control in the gulch. The population in Wahiawa on Oahu and Lawae on Kauai appears to be close to eradication as no calling frogs (Wahiawa) or much fewer frogs (Kauai) have been heard in recent months.

She said surveys are continuing on Mokokai for the coqui frog and it appears to be free of the frog at this time.

Maui has 13 established populations with five or more calling frogs. Ms. Pennimen showed a slide of the location of the populations on Maui. The large infestation on Maui is in Maliko Gulch and it is not certain what can be done about the population. The gulch is likely to be a testing ground for various frog control strategies.

Regarding early detection, the Oahu Invasive Species Committee is working with Bishop Museum on an early detection program for invasive plant species. Surveys by OISC have documented over 1,200 species. Of the 175 species that have not been vouchered at the Museum, 17 are known to be invasive elsewhere in the world. There are early detection projects underway on each of the islands at this point.

Agricultural targets of the Invasive Species Committees include noxious weeds, insect pests as well as diseases, including ivy gourd, fire ants, banana bunchy top disease, fire weed and others. Over the past three years, over 40% of ISC efforts have involved agricultural pests. Although Molokai does not have a state agricultural inspector, the Molokai ISC staff has partnered with USDA-APHIS-PPQ staff on some projects, including training on GPS and where surveys can be done.

Ms. Pennimen said that KISC has been working on the long thorn kiawe, clearing about nine acres of the weed.

Ms. Pennnimen mentioned the importance of support of partners, both in-kind and dollars, involving state, federal, county, private and non-profit organizations, and that this has been the key to the success of the Invasive Species Committees. She also said that HISC funds are very well leveraged. In closing, she thanked the HISC Council for its leadership and support.

<u>Research and Technology</u>

Christopher Buddenhagen, HISC Coordinator, DLNR, gave an update on the research and technology development efforts of HISC. He noted that HISC did not have funds for new R/T development projects last year; therefore, the report covers the period 2005 and 2006.

He said that research has been very applied, focusing on five areas, control, biocontrol, detection and risk. Biocontrol including miconia, various weed and Erythrina gall wasp, the supper sucker and lures for the nettle caterpillar. The range of pests, insects and weeds received a large proportion of the money. Partly because the marine group is breaking new ground it received significant funding for the super sucker program.

He reported that the University of Hawaii is the main research provider, USDA received some funding for biological control. He said that several groups including some not in Hawaii also received funds.

He reported that a pheromone based lure was developed for the nettle caterpillar, which is currently being used for detection surveys on Maui and Oahu. The lure attracts the male moth. The principal investigator, Dr. Eric Jang, is exploring the possibility of the lure being used for mass trapping and mating disruption to implement control and eradication.

A hot water shower project was funded for the disinfestations of nursery plants of the coqui frog. The technology is expected to be applied widely to prevent movement of the frog in Hawaii.

The super sucker was developed with research money to remove algae weeds. Recent surveys suggested that areas cleared of the weed appear to repopulate with the algae more slowly as a result of the predation on the alga by fish. Therefore, the impact may be longer term for this method of cleaning out noxious algal species.

Mr. Buddenhagen reported that most of the money goes into biological control contracts that support USDA and HDOA work. He mentioned that one project included a search for nematode pests in Mexico for noxious weeds in Hawaii.

West Nile Virus

Larry Lau, Deputy Director of Environmental Health, HDOH, reported that HDOH was very grateful to the HISC for the funding received. HDOH has been very active with many partners. Their accomplishments include continued surveillance for mosquitoes by Vector Control Branch and trapping and testing by State HDOH labs. He said over 2,900 mosquito pools were tested, made up of over 113,000 mosquitoes.

He said over 1,483 live birds have been tested and USDA-APHIS and Wildlife Biology and other agencies have been testing as well and that more islands are being covered. Dead birds have been tested by Vector Control Branch and USGS. A week spot has been the 211 hotline, which has been operating but the number of calls have declined in 2007 from 2006. He mentioned that, in the past, a big media push helped increase the numbers of calls, but have not been able to sustain that media presence. The Vector Control has been treating for mosquitoes and tracking the work in the field with hand held GIS units provided by HISC funds. HDOH also plans to use HISC funds to install GIS units for its trucks in the future. Outreach efforts continue as well with a

website and through the media. An online bird submission form should be available soon. He mentioned that HDOH staff time has been significant as well. He said that the prospects are to continue operations with more live bird testing and increases in 211 calls. He did say that the one issue of importance is the timing of the money to DOH, which is critical. He said that in the past the money has come in the second half of the fiscal year, which makes it tougher to get projects up and running.

Co-Chair Sandra Kunimoto noted that the West Nile virus is now pretty much across the U.S., so basically Hawaii in this mode forever. She also mentioned that the HISC funding is for short-term projects; therefore, the state needs to look for long-term funding for West Nile virus.

2007-2008 HAWAII INVASIVE SPECIES COUNCIL BUDGET

Mindy Wilkinson, Invasive Species Coordinator, DLNR, presented the proposed HISC budget for 2008. Dr. Wilkinson pointed out where the $4 million budget for HISC, which is up from $2 million last year, is in context with other dedicated invasive species funding other than base budgets for the Departments of Health, Natural Resources, and Agriculture. She said that the Legislature has dedicated specifically for coqui frogs since FY 2006, with last year at a peak and a decrease to $800,000 for this year. The biggest impact will be on the Big Island, where the bulk of the $2 million has gone and has the largest infestation, which is conservatively estimated at ten square miles this year. She stated that, currently, the tools and resources for controlling the coqui frog are not sufficient to eradicate the frogs and that HISC has been trying to tie in with that money. They recognize that the coqui will be a problem for the foreseeable future. She said that the strategic plan for coqui frog is research, containment and control objectives and HISC hopes to support the effective use of the money which has been distributed as follows: $500,000 - Big Island; $200,000 – Maui; and $100,000 – Kauai.

Dr. Wilkinson reported that on biosecurity, there was a veto override for the bill authorizing collection of fees for sea containers. She also mentioned that although it was pointed out that an inspection facility was being built in Kahului, there were many other ports in the State, including maritime, that don't have facilities. She said they were hoping that when the inspection fees start coming in and is placed in a special fund that a combination of federal funds in partnership with HDOT and future capital improvement can improve this critical situation.

Sandra Kunimoto commented that the latest estimate on the container fees was revised by DOT to about $700,00 to $750,000.

Dr. Wilkinson stated that this was the fourth year since the HISC budget was originally presented to the Legislature in 2003 to start a pilot program for five years. She explained that they have been requesting funding of $4 million to provide a pool of money that would help start an experimental program by identifying critical projects that are currently not being funded that fill a gap that agencies or other partnerships in the State have not taken on. She said they are hoping that projects that have done well will be incorporated into agency budgets.

Research and Technology

Dr. Wilkinson hopes that Research and Technology will be added in this year and noted that although funding for Prevention projects have not been available for the past two years, it is not to say that it will not become available in the future. She gave a quick overview for the $375,000 budget for prevention projects such as DOH's West Nile Virus, which included Vector Control and Public Outreach.

Weed Risk Assessment

Dr. Wilkinson covered the $111,400 budget for this project, which includes the HISC mini newsletter. She mentioned that there were over 600 plant species that have been screened using the weed risk assessment and voluntarily adopted by Maui, Kauai, Oahu as well as the American Society of Landscape Architects (Hawaii Chapter) to help make decisions as to whether or not to recommend particular plants as weeds. She said that the HISC had agreed earlier this year to evaluate the weed risk assessment to see whether or not Hawaii could move towards a "white list," as recommended in the Governor's economic momentum council to screen items before they are brought in. Dr. Wilkinson said there is a high enough volume to create a platform for a "white list."

Pacific Island Learning Network (PILN)

Dr. Wilkinson said that PILN is Pacific wide and included the American territories as well as independent states in the Pacific. She explained that we should be involved because one PILN study showed that more than 70% of containers from Pacific Islands contained pests and their solution was to build up quarantine capacity in Hawaii, although it would be better to do pre-departure inspection . She said that PILN is providing an opportunity for a Hawaii team, led by Domingo Cravalho, to participate in a team exchange in Tahiti. Dr. Wilkinson said that Hawaii's project is called, "Better Intervention Across the Pacific Islands."

Hawaii Ants Projects Coordinator and the West Nile Virus and Emergent Diseases Coordinator.

Dr. Wilkinson said the Ant Project Coordinator is a continuation of a project that was funded two years ago and having one person focus on ants was a recommendation after a biosecurity discussion last year with New Zealand. In regards to the West Nile Virus and Emergent Diseases Coordinator, she said that CDC is no longer funding a position in the DOH and USFWS had provided a person, who has since moved on. She said that the lack of funding and subsequent vacancy has not improved the accountability or monitoring the efficacy of efforts in detection and prevention of emergent diseases.

Ballast Water and Hull Fouling Project

Dr. Wilkinson said this project was proposed by the DLNR Division of Aquatic Resources. She mentioned that in 2005 this Division put together a proposal but was, unfortunately, not successfully completed. She said that one of the stumbling blocks at that time was that they did not have someone dedicated to that position. They have since hired Biologist Jason Leonard, who will accomplish the key components of data management such as identification of survey areas, develop outreach, training and identification, and possibly create a remote-operated vehicle for security and also for biological safety situations.

Response and Control

Dr. Wilkinson gave a brief overview. She pointed out that the key goals are: 1) Early detection; 2) Identifying items that are just getting established; and 3) Ability to respond.

Research and Technology

Dr. Wilkinson said there will be two proposals: 1) Broad program goals that encourages researchers to address invasive species problems such as implementation of new technology to prevent the establishment and control of invasive species, develop an effective science-based approach to invasive species, and effectively communicate the results of research to the field where it can be applied; and 2) Focus on coqui frog control methods.

Dr. Wilkinson pointed out that although it will be the same funding, there will be flexibility between the two proposals. Co-Chair Kunimoto agreed with the idea of flexibility. She also wanted to bring to everyone's attention that there should be one person representing each of the voting members on the Council when issuing the Request for Proposal (RFP) and doing the evaluation of the proposals. Ms Kunimoto said she was informed that members of the evaluation committee have to be named when issuing a RFP, so she asked each Council member to have a representative in mind to facilitate the issuance of a RFP.

Dr. Wilkinson mentioned that Sam Ostrander is chairing the Research and Technology Working Group and they will make sure that all agencies are represented. She continued by saying that they are tied into the State procurement process and confirmed that listing of evaluators is a requirement by law.

Public Outreach

Dr. Wilkinson gave a brief overview. She said the proposed budget will continue to support staffing, supplies, etc., for projects, and a larger scale invasive species campaign to be sure that the message as to why we are doing this will get out.

HISC Administration Support

Dr. Wilkinson said that this budget has going up. She said that staffing costs cover two staff members: Chris Buddenhagen, HISC Coordinator, who coordinates many of the documents, the strategic plan, assists working groups, and is a technical expert on invasive species and Karmin Kine, HISC Grants Manager, who makes sure that all contracts are proceeding and that information by researchers in the reports are available.

She explained that the indirect costs are tied to the previously mentioned staff and covers contracting with RCUH (University of Hawaii) and PCSU. She continued with the Central Services Fee, which is assessed by Budget and Finance for maintenance of a special fund (7% of $3,000,000 of the total HISC budget of $4,000,000). She also explained that the 2% DOFAW Overhead is not 2% of the budget but the percentage of the money that will be administered directly by the Division of Forestry and Wildlife.

The final category was the Contingency Fund. She said that this amount covers State reductions or across-the-board reductions to avoid funding shortfalls. She pointed out that the explanation in the budget submission refers to the amount as reserved funds and in the case that these restrictions are not imposed, the money would be used as an emergency response for invasive species. She said that for the past three years, this plan has failed and does not recommend it. She further explained that in addition to the logistics of deciding what constitutes an emergency that is over and above what has been developed by the response and control projects and agencies, they have not been able to find a mechanism to create a special fund to shelter this money so it wouldn't lapse. Dr. Wilkinson said it has been suggested to use the contingency fund to conduct legal reviews over the next year or two on both existing departmental authorities for invasive species as well as institute rules based on HRS 194, which established the Council.

Member Sam Callejo, UH, asked what was appropriated in the second year of the biennium, which is 2009? He was informed that $4 million was appropriated. He asked how much of this budget is recurring personnel costs? Co-Chair Kunimoto said it has been identified as program staff mostly in DLNR for the programs that they administer. She mentioned that HDOA does not receive funds for positions. Member Lau, DOH, said they have one contract position that is funded.

Mr. Callejo asked if any are full-time State positions or are they contract? Dr. Wilkinson replied that none of the funding is for state staff. She said the approximate 60 staff with the Invasive Species Committees and the Aquatic Invasive Species Team are funded through RCUH. She said a legislative request was tuned in for this coming biennium for Invasive Species Biologist positions but the request has not yet left DLNR. She also mentioned that the Dept. of Health is dependent upon CDC funding. She said that other avenues could be taken to fund these positions, but none have been successful this biennium except for the Dept. of Agriculture positions.

Mr. Callejo asked what was the Governor's plan beyond 2009? Ms. Kunimoto answered that this matter has not been discussed with the Governor.

Mr. Callejo inquired whether the Central Services fee of $210,000 could be waived because it is for short-term programs? Mr. Conry, DLNR, replied that a percentage is assessed on all special funds and, in this case, it is taken from the Natural Area Reserve Fund (NARS). He explained that the original budget request by the Governor four years ago was for general funds. The Legislature, in turn, funded $2 million from general funds and another $2 million from special funds. Thereafter, requests were continually submitted to replace the special funds with general funds; however, it has never been reflected as such in final Legislative budgets. Mr. Conry confirmed that the current budget shows $3 million is from the NARS special fund and the remaining $1 million is from general funds.

When Co-Chair Smith asked if there was flexibility to make a decision later in regards to the contingency fund, Ms. Kunimoto agreed as suggested that the Co-Chairs retain the ability to make a determination at a later date if the money is not used. Mr. Smith stated that this should be kept track of and would probably need to be assigned to someone.

Mr. Lau, DOH, wondered how Council would deal with issues regarding line items such as equipment that may not be available for whatever reason and whether the money could be used within a project or a cross project? Mr. Smith replied that a meeting could be convened to make a determination. Ms. Kunimoto felt that if it stayed within a component, it probably might be considered a minor shift.

Ms. Kunimoto asked if it was possible for DOH to receive West Nile funding prior to the third quarter and if there was any way to speed up the process? Dr. Wilkinson replied that the DLNR staff drafts a request for transfer of funds to the Governor as soon as the Council approves the budget. She stated that last year it took nearly eight weeks for the Governor's approval. Dr. Wilkinson said she would continue to do her best and welcomed any suggestions to increase the speed in which transfers are approved.

There was no further discussion.

MOTION: Council members approved the FY 2008 budget proposal as presented and the motion was carried unanimously.

Michael Buck commented on the good work by HISC. He said that HISC is 75% special funded, with 60-80 contract positions that may go quickly. He urged Cabinet Heads to actively participate in the next budget cycle to try to get more permanent funding for HISC.

ADJOURNMENT

The meeting was adjourned at 4:01 pm by Co-Chairperson Allan Smith.