REPORT TO THE TWENTY-SEVENTH LEGISLATURE
REGULAR SESSION OF 2013

BUDGETARY AND OTHER ISSUES REGARDING INVASIVE SPECIES

Prepared by:

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

In response to Section 194-2, Hawaii Revised Statutes

October 2012

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I. The Hawai‘i Invasive Species Council (HISC)

Purpose of this Report

The State Legislature authorized the creation of the Hawai‘i Invasive Species Council (HISC) under Act 85, Session Laws of Hawaii (SLH) 2003, and stated that "the silent invasion of Hawai‘i by alien invasive species is the single greatest threat to Hawai‘i's economy, natural environment, and the health and lifestyle of Hawai‘i's people and visitors." Chapter 194, Hawaii Revised Statutes (HRS), establishes the interagency HISC, determines its composition and responsibilities, and gives its member agencies special abilities to enter private or public property to control invasive species (Appendix 1). The HISC is composed of the chairs or directors of five state departments concerned with invasive species, as well as the President of the University of Hawai‘i. The HISC's purpose is to coordinate and promote invasive species prevention, control, outreach and research. This report provides an update on progress toward that goal and meets the reporting requirements of Section 194-2, HRS, and Section 28 of Act 158, SLH 2008, to annually report to the Legislature on budgetary and other issues regarding invasive species. Though the HISC is an interagency collaboration, Chapter 194, HRS, places the HISC within the Department of Land and Natural Resources (DLNR) for administrative purposes.

Composition of the Hawai‘i Invasive Species Council

Chapter 194, HRS, requires that the HISC be composed of the chairs, directors, or designees of the organizations listed below. Names of council members are provided for the reporting period of July 2011-June 2012:

• Chair, DLNR	William J. Aila
• Chair, Hawaii Department of Agriculture (HDOA)	Russell S. Kokubun
• Director, Department of Transportation (DOT)	Ford Fuchigami, for Glenn Okimoto
• Director, Department of Health (DOH)	Gary Gill, for Loretta J. Fuddy
• Director, Department of Business, Economic Development and Tourism (DBEDT)	Jesse Souki, for Richard Lim
• President, University of Hawaii (UH)	Sylvia Yuen & Carl Evensen, for MRC Greenwood, Ph.D.

Additionally, Chapter 194, HRS, identifies non-voting participants to be invited to provide advice and assistance to the HISC. These participants include four state senators, one from each county, and four state representatives, one from each county. Additional participants may also be invited, and have traditionally represented the Department of Defense (DOD), the Department of Hawaiian Home Lands (DHHL) and the Department of Commerce and Consumer Affairs (DCCA). For the reporting period of July 2011-June 2012, participants in the proceedings of the HISC included:

- Sen. J. Kalani English
- Sen. Clarence Nishihara
- Sen. Gilbert Kahele
- Sen. Ronald Kouchi
- Rep. Mele Carroll
- Rep. Clift Tsuji
- Rep. Derek Kawakami
- Rep. Mark Hashem
- Keali‘i Lopez (Director, DCCA)
- Mayor Alan Arakawa
- Rob Parsons for Mayor Arakawa
- Angela Kieran-Vast for Maj. Gen. Darryll Wong (Adjutant General, DOD)

The HISC is required by statute to meet at least twice annually to review issues relating to invasive species and to provide direction to the HISC support staff and working groups. The HISC working groups are led by designated state departments and are comprised of project leaders from various governmental and non-governmental organizations. These working groups include:

- Prevention Working Group, chaired by DOA
- Established Pests (Response and Control) Working Group, chaired by DLNR
- Research and Technology Working Group, chaired by UH
- Public Outreach Working Group, chaired by DOT.

These working groups assist the HISC in fulfilling its legislated responsibility to maintain a broad overview of the invasive species problem in the state.

HISC co-chair Russell Kokubun (HDOA) addresses the audience at a community center in Pukalani during the HISC's first ever neighbor island meeting. Left to Right: Senator J. Kalani English, Senator Clarence Nishihara, co-chair Russell Kokubun (HDOA), co-chair William Aila, Jr, (DLNR), Carl Evensen (UH), Gary Gill (DOH), Ford Fuchigami (DOT).

HISC Strategic Plan

From July 2011 to June 2012, the HISC met four times to review and approve actions related to fulfillment of responsibilities identified by Chapter 194, HRS, and the goals and measures of effectiveness described by the HISC Strategic Plan (2008-2013). The Strategic Plan identifies priority goals and measures of effectiveness as follows:

HISC Goal: 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. More detailed goals are provided in the HISC Strategy 2008-2013, available at hawaiiinvasivespecies.org/hisc/.

HISC Measures of Effectiveness

- Approval of annual budget, detailed in this report (Chapter II)
- Advice and recommendations to Governor or Legislature, detailed in this report (Chapter IV)
- Reports to the Legislature regarding invasive species, represented by this report
- Meeting reports (including working groups). Detailed at the HISC website, http://www.hawaiiinvasivespecies.org/hisc/

- Attendance at meetings of member and collaborating agencies, detailed at the HISC website
- Agency adoption of innovative projects, rules and policies against invasive species, detailed in this report
- Number of new invasive species detected at ports of entry, maintained by the Department of Agriculture
- Names and numbers of priority pests threatening Hawai'i, detailed in this report
- Working group goals achieved, detailed in this report (Chapters V-VII).

HISC Meetings in Fiscal Year 2012

Minutes for meetings of HISC and working groups are available at hawaiiinvasivespecies.org/hisc/

1) August 18, 2011: Approval of HISC Budget

Since Fiscal Year (FY) 2005, the HISC has received a combination of special funds from the Natural Area Reserve Fund (NARF) and, from FY05-FY08, general funds from the state legislature. In FY12 the HISC approved spending plan for $1,800,000 to fund 19 projects relating to invasive species prevention, control, and outreach. The accomplishments of each project are subsequently described in this report, organized by working group:

- Prevention: $136,429
- Response and Control of Established Pests: $1,136,102
- Research and Technology: $0*
- Public Outreach: $201,000
- HISC Support (includes overhead and Central Service fees): $326,468

*Funding for Research and Technology has not been provided in recent years due to a sharp reduction in the amount of special and general funds made available to the HISC.

2) September 30, 2011: Identification of FY12 Policy Goals

The HISC discussed a number of policy goals and identified which goals could be feasibly undertaken in FY12. These included:

- Drafting a bill to amend Chapter 91, HRS, to expand the conditions under which emergency rules may be adopted, to include threats to natural resources. This bill was drafted by HISC staff and became law (Act 149) following the 2012 Legislature.
- Assisting with the amendment of DLNR administrative rules and bill drafting regarding the transport of introduced wildlife. HISC staff provided advice on amendments to Chapter 13-124, Hawai'i Administrative Rules (HAR), which is pending Governor's approval. HISC staff also assisted with language in a bill that amends Chapter 183D, HRS, to prohibit possession and transport of deer, which became law (Act 144) following the 2012 Legislature.
- Securing funding for the HISC. No dedicated funding source was secured for the HISC during FY12. HISC staff and partners assisted with support for DLNR's Watershed Initiative, which includes some funding for invasive species control in priority watershed areas.


Mayor Arakawa addresses the HISC in Pukalani, Maui.

Additional policy goals were deemed to be long-term targets that would be explored in FY12 and beyond, including the development of administrative rules for the HISC describing a designation process for invasive species, increased regulation of plant importation and transport, and increased regulation of aquatic invasive species.

3) January 10, 2012: Micronesia Biosecurity Plan and Pre-Legislative Session Discussion

The HISC adopted Resolution 12-1: "Supporting the Micronesian Biosecurity Plan (MBP) Review and Implementation, and Requesting the Inclusion of Hawai'i as a Potential Recipient of Invasive Species." (Appendix 2) This Resolution achieved three goals:

1) Recognize the leadership of the United States Department of Defense in funding this unprecedented regional initiative
2) Support the review of the MBP and the development of the Strategic Implementation Plan (SIP), and
3) Request that both the MBP and SIP recognize the risk of invasive species being introduced to Hawai'i as a result of the buildup, and provide recommendations to reduce that risk.

The HISC members also heard a request for state support of a plan to mitigate the impacts of axis deer on Maui. Council members agreed to identify individuals within their respective departments to advise the creation of a deer management plan for Maui. Finally, council members shared their respective department's goals for the upcoming legislative session.

The HISC and partners visit a farm in Kula, Maui to witness axis deer damage, on May 8, 2012. Left to Right: Warren Watanabe (Farm Bureau), Senator Clarence Nishihara, Wayne Omura (Farmer), Rob Parsons (Office of the Mayor, Maui), Adam Radford (MISC), Keren Gundersen (KISC), Teya Penniman (MISC), William Aila, Jr (DLNR), Russell Kokubun (HDOA), Carl Evensen (UH), Josh Atwood (HISC), Randy Bartlett (East Maui Watershed Partnership), Senator J. Kalani English, Gary Gill (DOH), Ford Fuchigami (DOT), Forest Starr (MISC), Kim Starr (MISC).

4) May 8, 2012: HISC's First Neighbor Island Meeting on Maui, Discussion of Axis Deer

The HISC held its first-ever meeting on a neighbor island in Pukalani, Maui, on May 8, 2012. Hosted by the Mayor's Office of Maui County and the Maui Invasive Species Committee, council members heard from Maui residents regarding the impacts of axis deer on agriculture, livestock, and human safety. The HISC requested that the Maui Axis Deer Working Group prepare a proposal for HISC funding in FY13, outlining a strategy to mitigate deer impacts. Council members also discussed the need for dedicated funding for conservation organizations including the HISC. Council members visited the headquarters of the Maui Invasive Species Committee to hear about their operations and to participate in a demonstration of herbicide ballistic technology (HBT), an herbicide delivery tool developed by Dr. James Leary at the UH. Council members were also taken to a farm in Kula to witness crop damage by axis deer.

HISC Support Staff

Support staff in FY12 included a HISC Coordinator at 1.0 FTE and a Communications Coordinator at 0.7 FTE. In FY12 the HISC Coordinator role was filled by Josh Atwood with the Communications Coordinator role filled by Jacqueline Kozak Thiel. HISC support costs comprised $54,565 of the HISC FY12 budget. Actual HISC support costs were estimated at roughly $125,000 for the full fiscal year, but the budgetary request for HISC staff was decreased by $70,000 to account for a surplus left over from the departure of additional HISC staff in FY11.

FY12 achievements for the HISC Coordinator included:

HISC Coordinator Josh Atwood with a brown tree snake caught on Guam.

- Coordinated four full council meetings, one co-chair focus meeting, 12 one-on-one meetings with council members, one Prevention Working Group meeting, three Public Outreach working group meetings, two Established Pest Working Group meetings, and one priority setting meeting prior to initiating the FY13 call for proposals.
- Disbursed of $1.8M in HISC awards, with an associated $300,000 in general funds and $200,378 in special funds from DLNR's Division of Forestry and Wildlife. (See Chapter II)
- Drafted House Bill 2593 for the HISC. The bill passed (Act 149, SLH 2012), resulting in amendments to HRS 91 allowing departments to adopt emergency rules to respond to environmental threats.
- Toured brown tree snake interdiction programs on Guam and Saipan at the invitation of the United States Fish and Wildlife Service, along with HISC co-chair Russell Kokubun and Prevention Working Group chair Carol Okada.
- Helped organize a briefing for the Administration's cabinet members and the Hawaii Green Growth initiative about the Micronesia Biosecurity Plan with Phil Andreozzi from the National Invasive Species Council.
- Drafted Resolution 12-1 regarding HISC support for the review of the Micronesian Biosecurity Plan (Appendix 2).
- Assisted in coordinating a legislative information session on invasive species issues featuring presentations by HISC staff, the Invasive Species Committees, HDOA, DLNR, and the Coordinating Group on Alien Pest Species (CGAPS).
- Assisted DLNR in drafting and presenting testimony supporting invasive species programs and funding in the 2012 Legislative Session.
- Added the HISC as a charter member to the Pacific Invasives Partnership and facilitated communications with the Guam Invasive Species Council and the Micronesia Regional Invasive Species Council.
- Served as a committee member for each of the island-based Invasive Species Committees.

FY12 achievements for the HISC Communications Coordinator included:

- Presented to numerous community groups and individuals about the HISC and invasive species issues, including students, farmers, legislators, cultural practitioners, chefs, gardeners, business owners, and artists.

Communications Coordinator Jackie Kozak Thiel at a biosecurity checkpoint for Tiritiri Matangi Island, New Zealand.

- Supported HISC member agencies, partners, and funded projects on public outreach strategic planning and implementation.
- Attended the Pacific Invasives Partnership's annual meeting in Suva, Fiji with sponsorship from the National Invasive Species Council. Collaborated with the Secretariat of the Pacific Regional Environment Programme (SPREP) on an action plan for strategic communications about invasive species in the Pacific.
- Awarded the Pacific Exchange for Emerging Professionals by the Hawaii Conservation Alliance. Participated in a two-way exchange with Carolyn Lewis, National Coordinator for Weedbusters New Zealand, visiting over 60 conservation professionals and projects in New Zealand to learn about innovative communications, partnerships, community-engagement strategies, and public education programs that contribute to conservation success. Carolyn Lewis presented to the HISC about New Zealand's biosecurity policy and programs.
- Co-facilitated Biocontrol Working Group meetings with The Nature Conservancy. The Hawaii Biocontrol Working Group was reconvened to provide a venue for information sharing between biocontrol researchers and practitioners.
- Coordinated The New Day Garden at Washington Place in partnership with HDOA and DOT, Voyager Schools, Kokua Hawaii Foundation, and other organizations and businesses to promote the "buy and grow local" message in support of preventing the risk of invasive species on imported food cargo.
- Served on the statewide, interagency Partnership to Protect Hawaii's Native Species to support public outreach about the impacts of invasive rodents and mongoose.
- Organized a panel session with the United States Fish and Wildlife Service on invasive species partnerships in Hawaii for the National Wildlife Society's Working Group meeting November 9, 2011, which featured HISC, the Big Island Invasive Species Committee, CGAPS, and the Watershed Partnerships.
- Coordinated an Ant Communications Workshop in Hilo with HDOA and Hawaii Ant Lab to draft a statewide communications plan for the Public Outreach Working Group about invasive ants.
- Drafted press releases to publicize Senator Mike Gabbard's recognition for the Invasive Species Committees and FY13 budget approval. Collaborated with HISC member agencies and partners on joint press releases.


Participants at a meeting of the Pacific Invasives Partnership in Suva, Fiji.

II. Money Spent on Invasive Species Management in Hawai‘i, FY12

Money Made Available to the HISC

The HISC has received a combination of special and general funds from the State of Hawai‘i since FY05. The HISC has no dedicated funding source and currently receives special funds from DLNR subject to available revenues and as shared amongst other conservation programs.

General Funds: General funds provided from the State Legislature were historically provided at $2,000,000 annually, but this amount was reduced to $1,000,000 in FY09 and to $0 beginning in FY10. Note that in FY07, the $2,000,000 designated for invasive species work was not provided to the HISC, but was rather provided directly to Hawai‘i County to support a county-lead initiative to eradicate coqui frogs. This initiative was ultimately unsuccessful.

Special Funds**:**

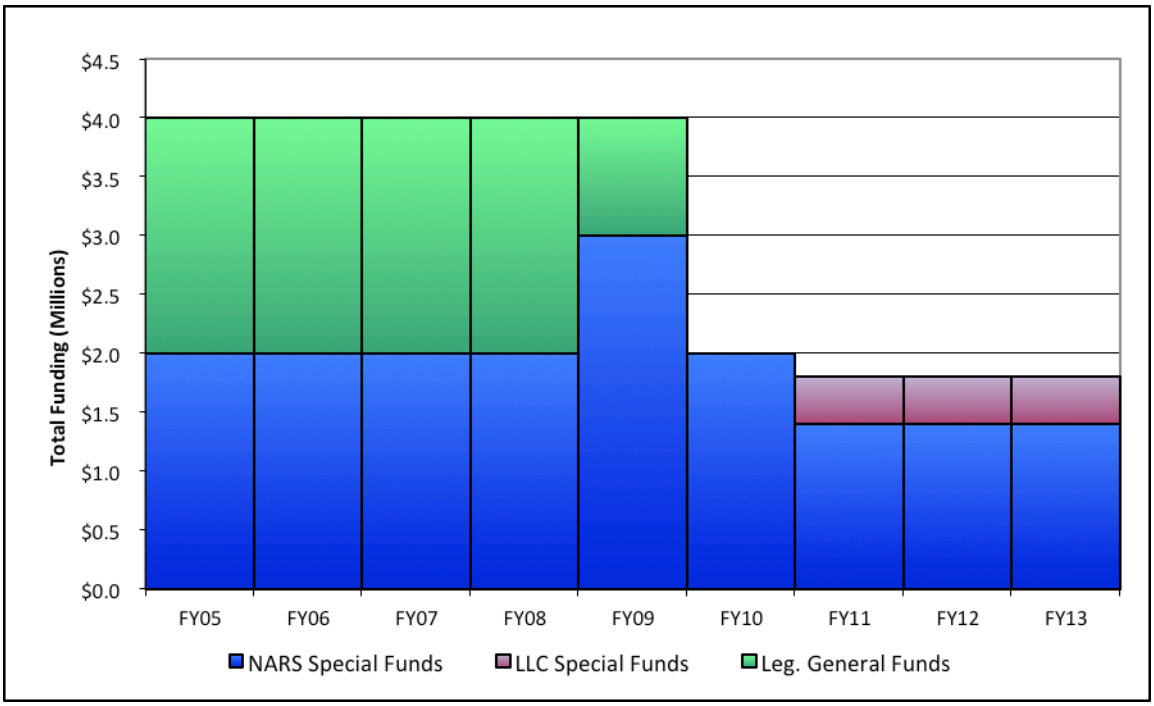
- Natural Area Reserve Fund: At the discretion of the Division of Forestry and Wildlife, special funds have been provided to the HISC from the Natural Area Reserve Fund (NARF), which receives a portion of revenues from the Conveyance Tax. The HISC historically received $2,000,000 annually from the NARF, but due to recent budget constraints this number has been reduced to $1,400,000.
- Legacy Land Conservation Program: From FY11 through FY13, decreases in the amount of funding made available to the HISC were partially offset by a temporary appropriation of special funds from the Legacy Land Conservation Program (LLC), which also derives funding from the Conveyance Tax. **This appropriation was for three years only and expires after FY13.**

Table 1: Total amount of funding (in millions of dollars) made available to the HISC through special and general funds, by fiscal year. Note that in FY07 the $2M in general funds from the Legislature went directly to Hawai‘i County for coqui control rather than through the HISC.

Source	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14
Leg. Gen. Funds	2.0	2.0	2.0*	2.0	1.0	0	0	0	0	?
NARS S-Funds	2.0	2.0	2.0	2.0	3.0	2.0	1.4	1.4	1.4	?
LLC S-Funds	0	0	0	0	0	0	0.4	0.4	0.4	0
Total	**4.0**	**4.0**	**4.0**	**4.0**	**4.0**	**2.0**	**1.8**	**1.8**	**1.8**	**?**

The large variance in the amount of funds available to the HISC each year has impacted the funding of projects. Due to the economic downturn in FY10, the Research and Technology Working Group ceased to offer a request for proposals and has not been funded since. This has helped maintain capacity built through the other working groups in ongoing programs.

Figure 1: Funding for the HISC, separated by source and fiscal year. Note that in FY07 the $2M in general funds from the legislature went directly to Hawai'i County for coqui control rather than through the HISC.



FY12 HISC Awards

On August 18, 2011, the HISC met to approve an annual budget comprised of 19 projects regarding invasive species prevention, control, and outreach, totaling $1,800,000.

Table 2: Total HISC funds separated by fiscal year and working group.

Working Group	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12
Prevention	1,340,000	1,516,535	410,000	736,400	565,400	740,000	155,266	155,465
Established Pests	1,700,000	1,560,000	1,115,000	1,754,500	2,100,700	820,000	1,120,282	1,215,213
Research & Tech	599,788	600,000	0	700,000	500,000	0	0	0
Public Outreach	158,000	113,000	0	50,000	20,000	0	149,488	194,757
HISC Support	102,212	135,465	230,000	488,700	427,200	244,200	222,964	54,565
Overhead	100,000	75,000	245,000	270,400	386,700	195,800	152,000	180,000
Total	**4,000,000**	**4,000,000**	**2,000,000**	**4,000,000**	**4,000,000**	**2,000,000**	**1,800,000**	**1,800,000**

Figure 2: Total HISC funds separated by fiscal year and working group.

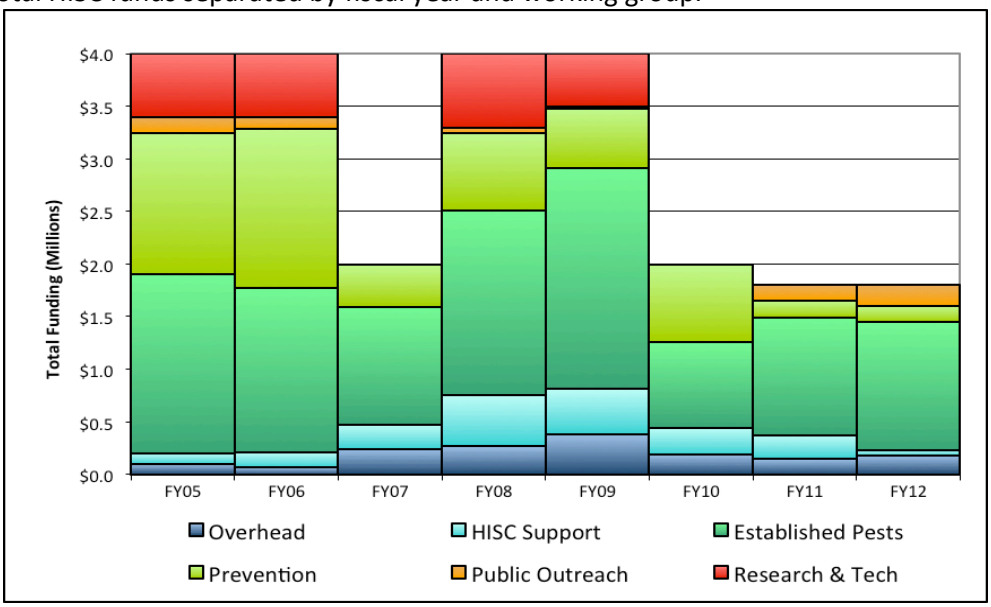


Table 3: FY12 HISC Awards

Organization	Project Title	HISC Award
HISC Support Total ($234,565)		
DLNR DOFAW	DOFAW Overhead (3% of $1.8M)	$54,000
DLNR Budget & Finance	Central Services Fee (7% of $1.8M)	$126,000
Hawai'i Invasive Species Council	Coordinator and Communications Coordinator	$54,565
Established Pests Total ($1,215,212.56)		
Kaua'i Invasive Species Committee	Kaua'i Island Invasive Species Detection & Control	$211,857
Oahu Invasive Species Committee	O'ahu Island Invasive Species Detection & Control	$208,042
Division of Aquatic Resources	Aquatic Invasive Species Management and Control	$207,531
Big Island Invasive Species Committee	Big Island Invasive Species Detection & Control	$205,000
Moloka'i/Maui Invasive Sp. Committee	Detection & Control of Invasive Sp. in Maui County	$180,000
Big Island Invasive Species Committee	Big Island Axis Deer Project	$90,000
Hawaii Department of Agriculture	Control of Little Fire and Emerging Pest Ant Species	$72,783
Hawai'i Department of Agriculture	Foreign Exploration and Introduction of Natural Enemies in Hawai'i for Suppression of Invasive Pests	$40,000
Public Outreach Total ($194,757)		
Moloka'i/Maui Invasive Sp. Committee	Public Outreach & Education in Maui County	$35,000
Oahu Invasive Species Committee	O'ahu Invasive Sp. Public Education and Outreach	$35,000
Big Island Invasive Species Committee	Hawai'i Island Invasive Sp. Education and Outreach	$33,490
Kaua'i Invasive Species Committee	Public Education and Outreach in Kaua'i County	$31,360
Hawaiian Ecosystems at Risk Project	Support of Invasive Species Public Outreach Efforts	$20,000
Division of Forestry and Wildlife	Landscape and Forestry Pest Identification Cards	$6,000
Division of Aquatic Resources	Aquatic Invasive Species (AIS) Outreach	$4,500
Pacific Cooperative Studies Unit	Management of Invasive Sp. Data & Web Products	$29,407
Prevention Total ($155,465)		
Hawai'i-Pacific Weed Risk Assessment	Support for Hawai'i-Pacific Weed Risk Assessment	$119,541
Division of Aquatic Resources	Ballast Water/Hull Fouling Coordinator	$21,481
Hawai'i Department of Agriculture	Early Detection of Africanized Honeybees & Exotic Honeybee spp.	$14,443
TOTAL		**$1.8M**

Other Invasive Species Funding Disbursed by DLNR

HISC awards are disbursed by the Division of Forestry and Wildlife (DOFAW) at (DLNR. In FY12, a number of additional awards were made available to projects from DLNR in order to supplement HISC awards or address emergency issues. This included general funds administered by DOFAW as well as special funds transferred from the Special Land Development Fund administered by the Land Division of DLNR.

Table 4: DOFAW general funds disbursed in FY12 as supplements to HISC awards.

Organization	Project	Award
Kaua'i Invasive Species Committee	Kaua'i Island Invasive Species Detection & Control	$40,000
Oahu Invasive Species Committee	O'ahu Island Invasive Species Detection & Control	$90,000
Big Island Invasive Species Committee	Big Island Invasive Species Detection & Control	$100,000
Moloka'i/Maui Invasive Sp. Committee	Detection & Control of Invasive Species in Maui County	$20,000
Pacific Cooperative Studies Unit	Management of Invasive Species Data and Web Products in Hawai'i	$50,000
Total		**$300,000**

Table 5: DOFAW special funds disbursed in FY12 for invasive species work outside of the HISC budget process.

Organization	Project	Award
BIISC Axis Deer Project	Axis deer control staff & equipment	$88,192
DOFAW Hilo District Office	Axis deer control equipment	$70,000
Kaua'i Invasive Species Committee	Detection & Control of Invasive Species on Kaua'i (Supplement for emergency mongoose response)	$42,186
Total		**$200,378**

The total amount of invasive species funding administered by DOFAW in FY12, including HISC special funds and other DOFAW general and special funds, was $2,300,378.

Details of projects that received HISC awards in FY12 are presented in Chapters V-VII of this report, separated by working group (Prevention, Established Pests, and Public Outreach).

III. Hawai‘i Invasive Species Council Reports

Overview of the Invasive Species Problem in Hawai‘i

The silent invasion of Hawai‘i by insects, disease organisms, snakes, weeds, and other pests is the single greatest threat to Hawai‘i’s economy, natural environment and to the health and lifestyle of Hawai‘i’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 Hawai‘i 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 Hawai‘i's current and future wellbeing.

A number of serious arthropod pests have been documented in Hawai‘i in the past 15 years. To prevent further introductions, more needs to be done to manage pathways, including building inspection and treatment infrastructure into Hawai‘i’s ports, inspections and treatment of at risk goods, and research into risk abatement strategies.

Some invasive arthropod pests documented as new to Hawai‘i (1997-2009)

- 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* (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
- Whitefly Parasitoid – 2007
- Thrips, *Dichromothrips smithi* – 2007
- Scarabaeid Beetle, *Cyclocephala pasadenae* – 2007
- Scarabaeid Beetle, *Temnorrhynchus retusus* – 2007
- Asian horntail wasp - 2009
- Myoporum thrips - 2009

More than 10,000 flowering plants have been introduced into Hawai‘i from the temperate or tropical zones of every major continent and about 1,215 have established wild populations in Hawai‘i, roughly equivalent to the number of native vascular plant species in Hawai‘i. 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. Only a subset of the nonnative species introduced to Hawai‘i are considered “invasive,” as they pose a significant threat to human health, the environment, and natural or cultural resources. Of the 1,215 established nonnative plant species, 107 species are considered serious invaders occupying space and competing with native plants in natural areas.

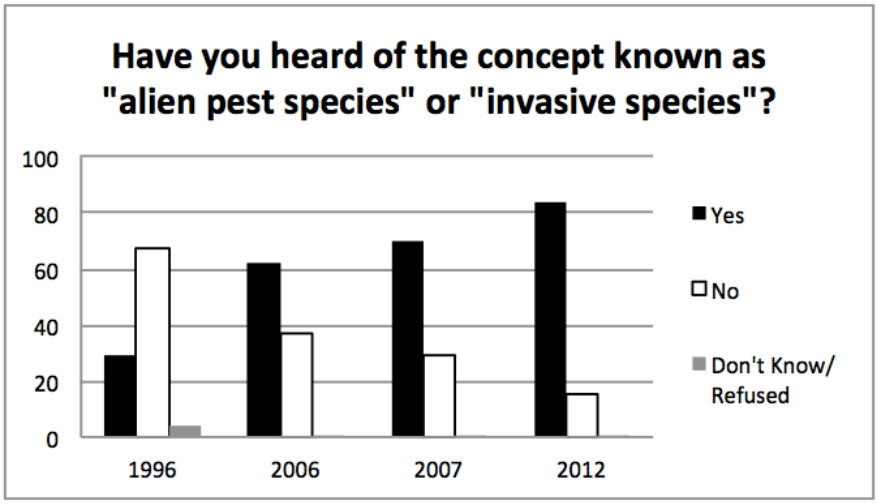
At least 19 alien mammals are established in the wild. A few feral species have far reaching impacts in natural areas altering forest composition and structure; damaging and consuming rare species that occur only in Hawai‘i. Many act as vectors of diseases that affect people and domestic animals. Rats, 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 Hawai'i in surprising numbers; they impact natural area values and the economy. In 2011 axis deer (*Axis* axis) were discovered on Hawai'i Island, where they had not previously been found. The transportation of axis deer to Hawai'i Island from Maui and/or Moloka'i presents a serious threat to Hawai'i Island's native forests and species. Priority and urgency should be given to the eradication of incipient populations of feral ungulates, island-wide eradications of vertebrates, and finally management of areas with high native biodiversity, cultural, social or economic value.

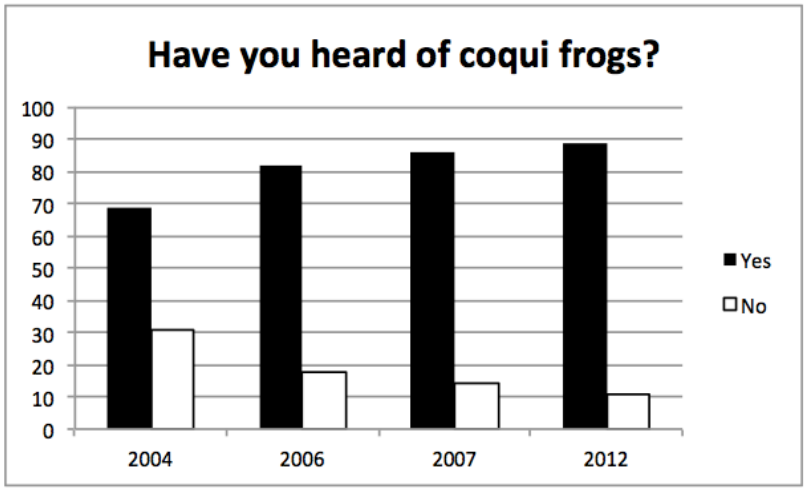
CGAPS Survey: Public Awareness of Invasive Species in Hawai'i

In 2012 the Coordinating Group on Alien Pest Species (CGAPS) contracted QMark Research to conduct a telephone interview of 500 Hawai'i residents regarding their awareness and opinions of invasive species. This survey was not funded or coordinated by the HISC, and results are shared here with permission of CGAPS. This survey was funded by the United States Fish and Wildlife Service. Interviewees were selected using a random dialing service. Of the 500 interviewees, 355 were on O'ahu, 65 were on the Big Island, 50 were on Maui, and 30 were on Kaua'i. The margin of error was 4.38% with a 95% confidence level.

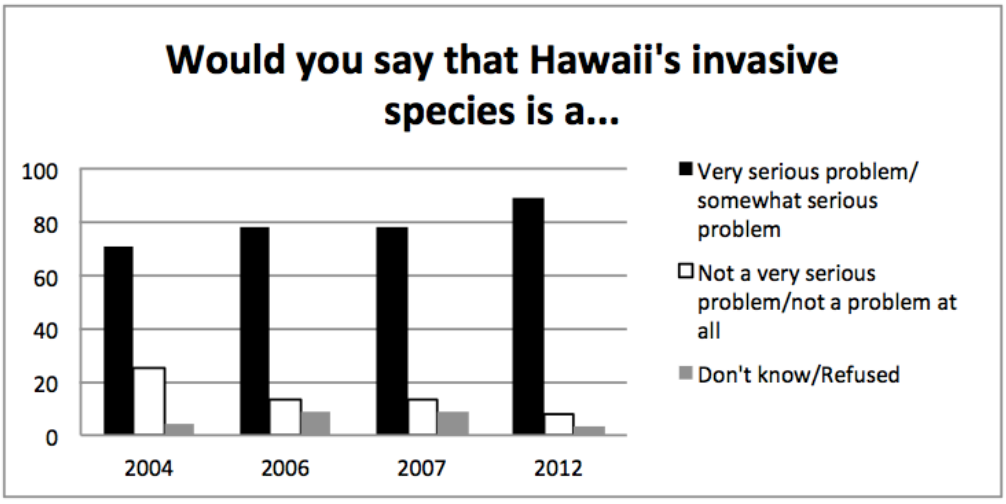
Awareness of the concept of "alien pest species" or "invasive species" increased steadily over the last 16 years, from 29% in 1996 to 84% in 2012. In the last five years alone, awareness of this concept increased by 14%.



Awareness of coqui frogs increased from 69% in 2004 to 89% in 2012. Awareness of the brown tree snake, one of the worst potential invaders of Hawai'i, has remained fairly constant since 2004, with 81-88% recognition over the 2004-2012 period. Awareness of miconia was also fairly constant, fluctuating between 42% and 53% over the past eight years.



The recognition of invasive species as a very serious or somewhat serious problem has increased over time, from 71% in 2004 to 89% in 2012.



The results of the CGAPS survey indicate that the public is increasingly aware of both invasive species as a concept and the threats posed by invasive species. For examples of public outreach on invasive species issues in FY12, see Chapter VII. For more information or a complete copy of the CGAPS survey, contact Christy Martin, CGAPS Public Information Officer, at christym@rocketmail.com or visit the CGAPS website at http://www.hawaiiinvasivespecies.org/cgaps/

Early Detection of Invasive Species

Efforts are expanding to detect new invasive species in the initial stages of establishing in Hawai'i. One example of an established detection program has been HDOA's efforts to survey for new pest insects and new plant and animal diseases of significance to agriculture. Occasional funding has allowed for specific surveys for new snail species, ants or other taxa, usually as a stand-alone project and not as an ongoing effort. Detecting species when they are limited to a few individuals or cover less than 10 acres increases the likelihood of an eradication effort by several orders of magnitude.

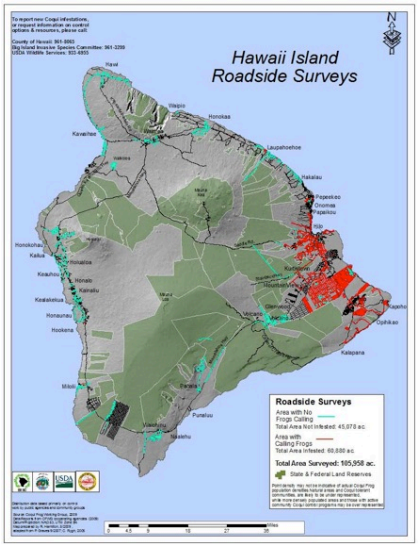
Early detection programs are now commonly used by the island-based Invasive Species Committee. On O'ahu, an island-wide roadside survey for incipient plants was completed in 2008. The same team of botanists traveled to Kaua'i in 2009 to work on a roadside survey there. The Maui Invasive Species Committee employs two botanists to conduct ongoing early detection surveys, as does the Big Island Invasive Species Committee. These early detection teams often work with the Hawai'i-Pacific Weed Risk Assessment to quantify the potential for invasiveness for newly discovered weeds.

Coqui Frog

The Puerto Rican tree frog, *Eleutherodactylus coqui*, has the potential to change native forest ecosystems. Population densities in some areas of Hawai'i have been recorded to be as high as three times the density found in Puerto Rico. Their nightly mating choruses can reach levels as high as 73 db, which is comparable to moderate to heavy vehicle traffic. Economic effects on the Big Island, stemming from their nightly choruses, have been felt through declining property values and a reduction of plant sales from nurseries.

Coqui frog, *Eleutherodactylus coqui*
Photo: AH Hara, University of Hawai'i

During the Legislative Session in 2008, Chapter 194, HRS, the law for HISC, was modified to include references to systematic management of coqui frogs on public lands near residential communities. A strategic plan for the management of coqui frogs can be found at the HISC website: www.hawaiiinvasivespecies.org/hisc/strategicplan.html



Hawai'i Island: By far, the worst coqui frog problem is on the Big Island. The main goal on the Big Island is to keep pristine natural areas free of the frogs, and to help the community control frogs around residential areas. With so much land on the Big Island infested (see map), the efforts to control frogs are only practical in a limited number of sites. Coqui frogs infested 60,000 acres on the Big Island in 2009.

While a recent Associated Press article declared that "Coqui frogs win battle for Hawai'i Island," (Honolulu Star Advertiser, August 22 2011), conservation groups on Hawai'i Island continue their work to limit the range of coqui frog and control or eradicate populations where possible. The Big Island Invasive Species Committee (BIISC) maintains a coqui response team within its Vertebrate Program. The BIISC team is working with communities to empower them "take back the night" on their own, through locating and mitigating coqui frog infestations in residential areas.

Maui: The Maui Invasive Species Committee (MISC) has successfully eradicated a number of isolated, satellite populations of coqui, though a handful remain across the island. MISC work on the coqui frog now focuses on a large population in Māliko Gultch, a long, steep-sided gultch on the Island's north shore. A large-scale operation has been mounted to address this heavily infested area, utilizing a network of pipes and sprinklers to deliver citric spray to various parts of the gultch. Manned hoses are also used to treat infestations from the bottom of the gultch. MISC has maintained excellent relationships with landowners in the area surrounding Māliko Gultch.

O'ahu: Coqui frog reports on O'ahu came from a variety of locations around in island in FY12. HDOA, the O'ahu District Office of DOFAW, and the O'ahu Invasive Species Committee (OISC) collaborate to respond to coqui frogs as quickly as possible. The reduction in staffing at both HDOA and OISC in recent years has limited the number of staff available to respond to coqui reports. In FY12, OISC was able to hire a new invasive species biologist to respond to coqui reports and other threats.

Kaua'i: In addition to periodic reports of new arrivals of coqui frogs, Kaua'i had an established population of coqui in Lawai. Following a strategic eradication effort, the Kaua'i Invasive Species Committee declared Kaua'i "coqui free" in FY12 upon the one-year anniversary of the last reported coqui call on Kaua'i.

Interisland Shipments: HDOA, counties and the ISCs work together to control populations on all islands and limit interisland movement of frogs by treating goods that originate from the Big Island, when possible. Due to lack of funding, staffing, and difficulty in finding all frogs in interisland shipments, frogs continue to be shipped interisland, particularly through horticulture. Most frogs arrive in shipments of nursery plants that come via the Big Island. A hot water treatment method, which was developed by a nurseryman on O'ahu using funds from HISC's Research and Technology Working Group, is now in use for this purpose.

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.), feral cats (*Felis silvestris*), and 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.

KISC employee Pat Gmelin poses with the first live mongoose capture on Kaua'i in May 2012.

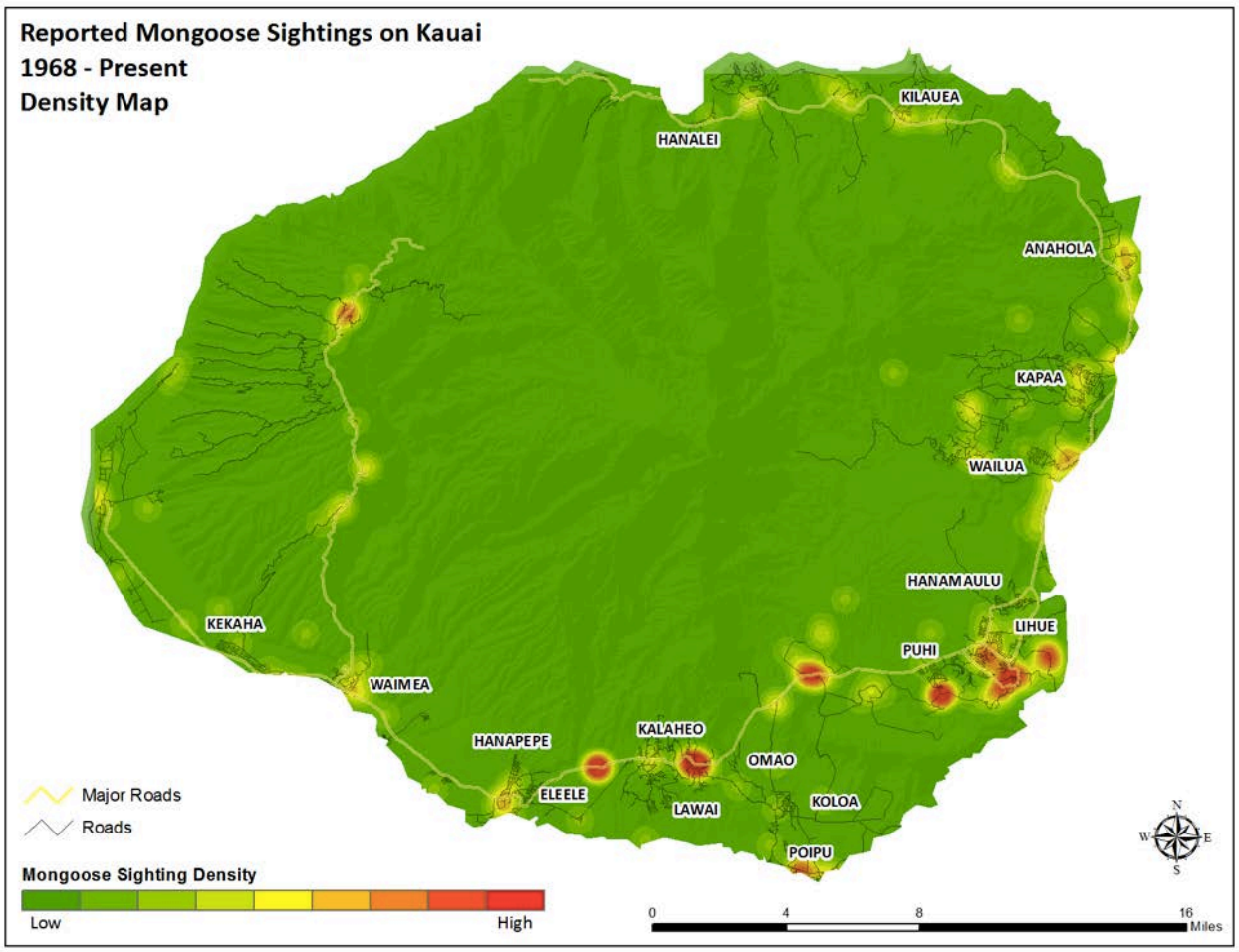
First live mongooses captured on Kaua'i

Mongooses were first brought to Hawai'i in 1883 by a group of sugar cane farmers on the Big Island, in an effort to control rat populations. The attempt was unsuccessful, due largely to the fact that rats are nocturnal and mongoose are diurnal. With no predators to keep the population in check, mongoose flourished and spread to neighboring islands. Prior to FY12, mongoose were thought to be found on each of the main Hawaiian islands except for Lana'i and Kaua'i. Due to the lack of a local mongoose population, Kaua'i was considered an excellent location for conserving native bird populations.

In FY12, the Kaua'i Invasive Species Committee trapped the first live mongoose on Kaua'i. While there had been over 160 credible reports of mongoose sightings dating back to the 1940's, no mongoose had been confirmed on the island save a single road kill specimen in 1976. Following a number of sightings in the spring of 2012 near the Kaua'i Lagoons Marriot in Lihue, the Kaua'i Invasive Committee partnered with DOFAW to deploy baited traps. The first mongoose on Kaua'i was captured on May 23, 2012 near

the Kaua'i Lagoons golf course. A second mongoose was captured at Nawiliwili Harbor on June 29, 2012, by employees of Young Brothers in cooperation with the Kaua'i Invasive Species Committee.

Maps of historical mongoose sightings prepared by the Kaua'i Invasive Species Committee indicate that the shift in interisland shipping operations from Port Allen to Nawiliwili Harbor correlates with a geographic shift in mongoose sightings, suggesting that interisland shipping may be a vector for the interisland movement of mongoose. The map below, prepared by the Kaua'i Invasive Species Committee, shows geographic density of over 160 historical mongoose reports from 1968 to 2012.



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.

A bird killed by West Nile Virus

Other diseases impact native wildlife. For example, avian botulism is the most prevalent disease in Hawai'i for native waterbirds. An outbreak of avian botulism occurred on Kaua'i in early 2012. The introduction of West Nile Virus 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.

Budget cuts at DOH have resulted in a sharp reduction in the staff and capabilities of the Vector Control Branch, meaning that many diseases and disease vectors are not being sufficiently monitored. Where Honolulu International Airport used to host approximately 100 mosquito traps, the number of traps in 2012 is roughly four. The remaining traps at Honolulu International Airport are the only routine mosquito surveillance conducted on O'ahu. The Department of Health detected the *Aedes aegypti* mosquito at the Honolulu International Airport in March of 2012. This mosquito has the ability to spread dengue and yellow fevers. In 2011, six cases of dengue fever were investigated by DOH.

Biocontrol

HDOA and the United States Forest Service are the two primary agencies in Hawai'i researching and utilizing biocontrol. In FY12, HISC staff helped convene meetings of the Biocontrol Working Group to facilitate communication regarding biocontrol efforts and goals among practitioners. An FY12 HISC award provided funds to HDOA to support travel of Mohsen Ramadan, an exploratory entomologist, to northern Africa in search of potential biocontrol agents. Ramadan was recognized for his work by Senator Mike Gabbard during a ceremony at the State Capitol Building on April 4, 2012. During preparations for the FY13 budget season, biocontrol was identified as a priority area by the HISC co-chairs and participants of the HISC working groups.

Biocontrol is one of the least understood tools for the control of invasive weeds and other pests yet it can be one of the most successful means of controlling widespread invasive species throughout its range. Myths and misconceptions that have been nearly impossible to dispel (for example, mongoose were not introduced to Hawai'i as part of a government sponsored biocontrol program, despite the common misconception that mongoose represent an early attempt at biocontrol) offset the very successful track record of biological control in Hawai'i dating back to the reign of King David Kalākaua. Modern biocontrol agents are carefully screened to ensure that agents are highly likely to only attack a target invasive species and will not have secondary negative impacts to other species. A successful

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


Nettle caterpillar, *Darna pallivitta*

In Hawai'i, two principles of biocontrol are followed: classical biocontrol and augmentative biocontrol. Classical biocontrol involves the identification use of natural enemies (either insects or diseases) within the native range of a pest for release into the environment the pest has established itself in. This process either requires exploration or collaboration. At the present time, foreign exploration is limited to one exploratory entomologist in the State of Hawai'i. HISC has funded exploratory projects conducted by HDOA and UH. The second form of biocontrol, augmentative biocontrol, involves the collection and release of biological control agents already established but of limited distribution. HDOA conducts projects such as this for newly established pests with natural enemies that are already established. One recent and successful augmentation project is the biocontrol of the papaya mealybug, a severe pest of papaya and plumeria in Hawai'i. In 2010, HDOA released a tiny parasitic wasp, *Aroplectrus dimerus*, as a biocontrol agent for the invasive stinging nettle caterpillar (*Darna pallivitta*).

The need for Improved Interisland Quarantine

Often invasive species arrive to one particular island in Hawai'i and become problems there but may not be transported to neighbor islands for years. Varroa mite, a parasite of honey bees, was found on the Big Island mid-year 2008 after being detected on O'ahu more than a year earlier. The pathway for this introduction was most likely from the interisland movement of goods from O'ahu. The queen bee and honey businesses are worth several million dollars a year on the Big Island, and this serious bee pest will have severe negative impacts on that industry. Interisland movements of cargo increase the risk of moving materials and products that spread invasive species. This highlights the need for increased inter-island quarantine to prevent the introduction of known pests to uninfested islands from all sources.

The risk posed by the interisland movement of vessels, vehicles and materials can be mitigated. Additional quarantine inspectors are needed to effectively screen the volume of interisland cargo. A review of current authorities is needed to ensure that action can be taken to mitigate the risk posed by all vehicles and materials moved inter-island. Infrastructure improvements at ports can provide both inspection areas and the facilities for treating products (e.g., a car wash) prior to moving materials between islands.

With roughly half of HDOA's 95 agricultural inspectors laid off in 2009, the ability to inspect interstate and interisland shipments has been severely reduced. In FY10, the HISC provided $600,000 to the HDOA to retain a portion of its inspection staff and capacity. In 2011, Governor Abercrombie restored 10 inspector positions at Honolulu International Airport. Additional inspection capacity will need to be provided for seaports and on islands other than O'ahu. In particular, interisland nursery and horticultural shipments leaving the Big Island are known to carry pests such as coqui frog and little fire ant.

County Involvement
Increased support from county governments is a priority for the HISC and its partner agencies. Maui County and Kaua'i County have demonstrated support for invasive species work through funding provided to the Maui Invasive Species Committee (MISC) and the Kaua'i Invasive Species Committee (KISC). Maui County was particularly involved with the HISC this year as the Office of the Mayor assisted in coordinating the first ever convening of the HISC on a neighbor island in May of 2012. Mayor Alan Arakawa addressed the HISC at the meeting, and county officials indicated that the county would like to collaborate with the State on mitigating the impacts of axis deer on Maui Island. The HISC requested that a proposal regarding axis deer management for funding in FY13.

Review of Conflicting Agency Mandates
HISC staff assisted with a review of DLNR and HDOA mandates during the drafting of amendments to Chapter 124, HAR, regarding injurious wildlife. Discussions were held with HDOA and DLNR staff to ensure that the prohibition of interisland movement of introduced wildlife by DLNR in HAR 124 would not conflict with interisland quarantine regulations enforced by HDOA. No conflicts were found.

Invasive species fines, penalties, and regulations
Each member agency or HISC working group has carried out reviews of laws and regulations on an ad-hoc basis.

In FY12, a bill from Senator Kahele was approved by the Legislature (Act 149), amending Chapter 183D, HRS, to impose regulations and fines specific to the movement, release, or possession of deer. Fines from infractions are deposited into the Wildlife Revolving Fund managed by DLNR and can subsequently be used for wildlife management projects including efforts to control deer.

In FY12 HISC staff also assisted DOFAW in created suggested amendments to Chapter 124, HAR, which would impose additional fines relating to the transport and release of introduced wildlife. These amendments were not yet adopted as of October 1, 2012.

IV. Advice to the Governor and Legislature Regarding Invasive Species

Micronesian Biosecurity Plan

In FY12, the HISC resolved to support review of the Micronesian Biosecurity Plan (MBP), a comprehensive biosecurity plan developed by the United States Department of Defense that could have widespread impact on biosecurity efforts in the Pacific. The HISC adopted Resolution 12-1 (Appendix 2) to:

1) Recognize the leadership of the United States Department of Defense in funding this unprecedented regional initiative,
2) Support the review of MBP and the development of the Strategic Implementation Plan (SIP), and
3) Request that both the MBP and SIP recognize the risk of invasive species being introduced to Hawai‘i as a result of the buildup, and provide recommendations to reduce that risk.

Governor Abercrombie convenes a meeting of the HISC in June of 2011.

The HISC and Current Invasive Species Issues

In FY11, the HISC reviewed two submittals provided by HISC staff at their June 27, 2011 meeting and approved the following recommendations:

1. Regarding the Functioning of the HISC
    a) **Recommendation**: The HISC directs the HISC staff to draft administrative rules to be promulgated by the HISC. (*Unanimously approved*). These rules would allow the HISC to designate species as “invasive.”
2. Regarding Current Invasive Species Issues
    a) Albizia

        Recommendation: The HISC supports listing albizia as a HISC-designated invasive species through an administrative rule process. (*Unanimously approved)*
    b) Mosquitoes

        Recommendation: That the HISC support HDOA and DOH in preventing and monitoring for new mosquito species in Hawai‘i, and that the HISC support, as a high priority, restoring capacity of DOH’s Vector Control Branch to prevent and control disease outbreaks. (*Unanimously approved as modified:* The HISC supports the HISC working groups to assist HDOA and DOH in developing a strategy to prevent and monitor the introduction of new mosquito species into Hawai‘i.)
    c) ‘Ohi‘a rust

        Recommendation: The HISC supports the establishment of a rule to restrict importation of plants in the Myrtle family into Hawai‘i. The HISC also supports a

program promoting locally grown alternatives to high-risk imports, including members of the Myrtaceae family. (*Unanimously approved*)

d) Axis Deer

Recommendation: The HISC and member agencies will pursue statutory and administrative rule changes and administrative actions to effectively control and regulate the introduction and movement of introduced wildlife species. (*Unanimously approved*)

e) Invasive species Prevention and Control

General Recommendation: That the HISC issue a statement of support for the control of invasive species and the prevention of their importation and interisland transport with the commitment to pursue the necessary rule changes that are critical in effective biosecurity and management. (*The HISCl directed HISC staff to produce a position paper*)

Organizational and Resource Shortfalls in Hawai'i

In 2008 a survey was carried out by HISC staff to determine organizational and resource shortfalls, including infrastructure, capitol improvements, staffing, research and other needs. This survey identified approximately $145 million in unaddressed needs. The survey was thorough (although not exhaustive) and amounts are estimated in most cases. This information-gathering exercise has produced a list of needs that may be prioritized so that funding particularly effective efforts, such as quarantine measures, would result in avoidance of the costs and impacts of pests that would arrive and spread without an adequate biosecurity system.

In short, prioritization is needed. A balance is needed between the seriousness of the threat posed by invasive species and the adequacy of the response to mitigate that threat. HISC staff have produced a brief summary of what is currently needed to protect Hawai'i from invasive species.

1) Modern Biosecurity System

Many invasive species that are not yet present in Hawai'i pose a serious threat should they arrive and become established. Species, such as the red imported fire ant, brown tree snake, West Nile Virus, avian influenza, and many others, have the potential to seriously impact the economy, natural environment, and the health and lifestyle of Hawai'i's people and visitors. The impact of red imported fire ant alone was estimated to reach $200 million annually within 10 years of introduction because of its impact on tourism, infrastructure and quality of life. Meanwhile, a 2010 study by Schwiff et al. estimated that brown tree snake impacts could cost $2.14 billion annually in infrastructure and health costs alone. This figure includes only the impact to electrical systems and the health care costs associated with snake bites, and does not include the cost of conservation programs to mitigate the loss of native bird species. Investing in a modern biosecurity system would stop or postpone these costs for years. Money saved in costs avoided easily justifies a significant investment in such a program.

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

track effectiveness.

2) Rodent and Predator Control to Protect Native Biodiversity

a) Offshore islets

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

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

b) Predator-proof fences in high value biodiversity sites

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

3) Restoration and Site Management to Protect Watersheds and Biodiversity

Invasive species control in pristine and near pristine sites and watersheds is required to protect biodiversity. Invasive plants negatively impact aquifer replenishment, and surface water, with native forest providing up to 30% more water than strawberry guava forests. Ungulates, including pigs, deer, sheep, antelope and goats, are managed in key areas to protect biodiversity, watershed values and to mitigate vectored diseases. Typically, ungulate management involves fencing off areas and removing all animals within the fence. In FY12, DLNR introduced "The Rain Follows the Forest," a watershed initiative to protect Hawai'i's water. The plan calls for $11,000,000 annually to fence priority watershed areas and control invasive animal and plant species. In 2012 the State Legislature appropriated $2,500,000 in Capital Improvement Project funds for fence building and directed DLNR to spend $2,500,000 of its special funds on watershed protection. The watershed initiative continues to be a focus for DLNR, and additional funding will be sought in FY13.

4) Biocontrol

The United States Forest Service, HDOA and UH are the agencies with biocontrol research capacity. The building of a new state biocontrol containment and testing facility is needed, as the two current facilities are inadequate to combat widespread species for which chemical and mechanical control is not cost effective. Biocontrol has high up-front costs since researchers must ascertain the biocontrol's specificity and safety via years of testing prior to being released. However, the control of target organisms is continuous once a biocontrol species is successfully established. Modern biocontrol is cost effective and environmentally safe, and it removes the need to use pesticides while reducing the impact of widespread invasive species. H**DOA is seeking funding for biocontrol facility improvements in the 2013 Legislative Session.**

5) Island-based Invasive Species Committees (ISCs)

ISCs focus on the objectives of early detection, containment and eradication of priority high risk invasive species for which these objectives are feasible. They are independent organizations, though they are partners with state and county agencies and these agencies are often committee participants. Due to limited resources their work is leveraged and HISC funds typically provide between 20% and 90% of their funding. Work is carried out using soft money sourced from a variety of state, federal and county agencies. ISCs provide the only early detection capability for new invasive plants—there are no agencies that are tasked with this work. In addition, many of ISCs provide the only trained crew that works consistently on major invasive pests, such as miconia. Field crews may have to travel for much of the day or camp out in sites remote from the main base yard, often accessing sites by helicopter. On Maui and the Big Island some crews are needed to work in specific geographical areas. GIS experts track fieldwork progress; training safety and vehicle operations are growing costs. Helicopter contracts are an expensive and necessary part of the work. As one species is eradicated or contained this may allow other lower priority species to become targets. A stable funding source for this group is greatly needed. Providing the HISC with a designated funding source would provide stable operating funds for the ISCs and other programs supported by HISC funds.

6) Emergency response fund

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

At present there is little to no rapid response capacity for these species. Even in situations where capacity has been built through training, funding may not exist to support a response effort. For example, there are approximately 30 people in Hawai'i who have been trained to respond to a report of a brown tree snake and assist in search efforts. Even if this capacity is maintained, the funding for equipment and staff time does not exist to adequately support a response.

An invasive species emergency fund of at least $1,000,000 would ensure, in most incursion scenarios, an initial search and control response that could potentially save the State billions of dollars in future control and eradication costs. These emergency funds would need to be provided in addition to annual operating funds for invasive species programs. Restoring historic funding to the HISC would require $4,000,000 annually. The total annual need of organizations receiving HISC funds in 2012, across all funding sources and assuming an ideal staff capacity, was over $13,000,000.

V. HISC Prevention Working Group

Prevention Working Group Goals

- Review risks of pest/invasive species entry into the State
- Implement measures and improve Hawai'i's capacity to prevent the entry of new pests/invasive species with shared resources and shared responsibilities of all agencies.
- A more detailed list of goals for the Prevention Working Group is in the HISC Strategy 2008-2013.

Funded Projects for FY12

The lead agency and chair for the Prevention Working Group is HDOA. In FY12, the Prevention Working Group funded three projects, totaling $155,465:

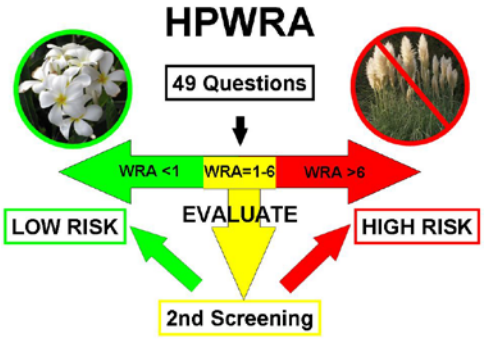
1) *Hawai'i-Pacific Weed Risk Assessment (HPWRA),* proposed by HPWRA staff: $119,541.
2) *Early Detection of Africanized Honeybees and Exotic Honeybee Species*, proposed by HDOA: $14,443.
3) *Ballast Water and Hull Fouling Coordinator*, proposed by the Division of Aquatic Resources, DLNR: $21,481.

Key Activities in FY12

- 182 new assessments made by HPWRA, totaling 1,308 assessments.
- Development of a Plant Pono website to assist landowners in making planting decisions
- Hiring of a Ballast Water and Hull Fouling Coordinator to inspect and monitor marine vessels
- Evaluation of Hawaiian sea port data to assess risk of aquatic invasive species introductions
- Placement and monitoring of swarm traps for invasive honeybee species
- Public education regarding invasive bee species

Little fire ant, *Wasmannia auropunctata*

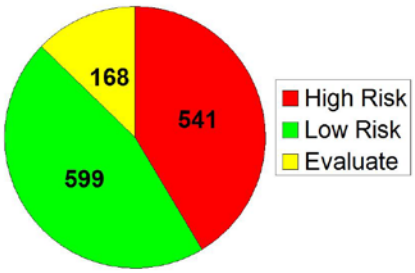
Title: Continued Support of the HPWRA
Organization: HPWRA
Award: $119,541



Introduction: HPWRA system is an internationally recognized screening tool that rates a plant's potential to become invasive by answering 49 questions about its biology, ecology and weediness tendencies elsewhere. The answers result in a score that predicts a plant's likelihood to be invasive in Hawaii or other tropical Pacific islands. The HPWRA aids in identification of invasive plants before they impact Hawaii's economy, ecology or human health and supports Goal one of the Prevention Working Group, to "review risks of pest/invasive species entry into the state". The HPWRA also addresses the Prevention objectives to "develop a comprehensive 'approved planting list' to ensure that invasive species are not being planted in state projects or by any state contractors, e.g. screened by the Weed Risk Assessment (WRA) protocol" and to "develop collaborative industry guidelines and codes of conduct, which minimize or eliminate unintentional introductions." In accordance with these objectives, two WRA Specialists have been 100% funded by the HISC to the amount of $119,541 in FY12.

Achievements in FY12

Expanded List of Assessments: The primary responsibility of WRA Specialists is to complete new and update old assessments, both for species already present in the Hawaiian Islands, as well as for new species introductions. This information is summarized and disseminated to the requesting individual or agency via direct correspondence, and to the public and land management agencies through technical and general publications, public presentations, and other outreach activities. In the previous 12-month period (July 2011 – June 2012), 182 new or updated assessments were completed, representing an increase of 20 assessments over the previous 12-month period (162 assessments from July 2010 – June 2011).



1308 assessments by risk category

As of June 30, 2012, 1,308 assessments have been completed and assigned to the following categories:

- High Risk (541 plants): Predicted to become invasive in Hawaii or Pacific Island ecosystems
- Low Risk (599 plants): Not predicted to become invasive
- Evaluate (168 plants): Needs further information to make a prediction of invasiveness

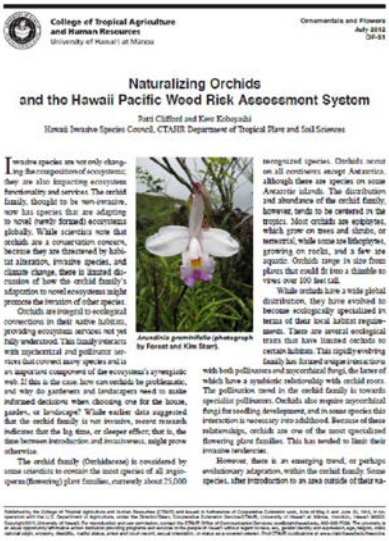
hpwra.org: Since October 2011, all new and previously completed assessments dating back to 2002 have been posted at hpwra.org (https://sites.google.com/site/weedriskassessment/home). This website has addressed a gap in the accessibility of assessments which were no longer being posted on the original WRA website (http://www.botany.hawaii.edu/faculty/daehler/WRA/), last updated in July 2009. The current website allows users to download any individual assessment, as well as a regularly updated list of all assessments completed to date. From

February 2012 (when site tracking began) to present, the website received 1,504 visits and 4,596 page views, demonstrating a continued interest and need for risk assessment predictions to make informed planting decisions. It is anticipated that traffic to the forthcoming Plant Pono website (www.plantpono.org/), a more user-friendly, non-academic planting site with HPWRA-generated content, launched in September 2012.

WRA Requests by Affiliation: During the period from July 1, 2011 to June 30, 2012, 226 requests were received to assess potential invasiveness of new plant species or to revise previous assessments. These requests originated from members of the general public and individuals associated with island invasive species committees, county, state and federal government agencies, private businesses, nurseries and botanical gardens, university researchers and extension agents, and international invasive species organizations, among others. Contact hpwra@yahoo.com for the full list of requests.

Public presentations and Outreach: To continue to promote awareness and encourage adoption of the HPWRA system, WRA Specialists have been involved in additional outreach activities with partner agencies and other interested parties. The following highlights outreach activities and efforts from Jul 2011 – June 2012:

- 25 January: Invasive biofuels presentation to Oahu DLNR staff utilizing WRA assessment information
- 25 January: Invasive plant presentation to the Legislature as part of the Silent Invasion Update for CGAPS
- 11 June: WRA presentation to Project Learning Tree at Maui Nui Botanical Garden
- 15 September: WRA talk and garden tour to the Maui Master Gardener's group
- July 2011 – June 2012: WRA specialist responded to twenty-four public inquiries directed to the Maui Invasive Species Committee about invasiveness of plants



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

Ornamentals and Flowers
July 2012
OF-51

Naturalizing Orchids
and the Hawaii Pacific Wood Risk Assessment System

Patti Clifford and Kwo Kobayashi
Hawaii Invasive Species Council, CTAHR Department of Tropical Plant and Soil Sciences

Invasive species are not only changing the composition of ecosystems; they are also impacting ecosystem functionality and services. The orchid family, thought to be non-invasive, now has species that are adapting to novel (newly formed) ecosystems globally. While scientists note that orchids are a conservation concern, because they are threatened by habitat alteration, invasive species, and climate change, there is limited discussion of how the orchid family's adaptation to novel ecosystems might promote the invasion of other species.

Orchids are integral to ecological connections in their native habitats, providing ecosystem services not yet fully understood. This family interacts with mychorrizal and pollinator services that connect many species and is an important component of the ecosystem's synergistic web. If this is the case, how can orchids be problematic, and why do gardeners and landscapers need to make informed decisions when choosing one for the house, garden, or landscape? While earlier, data suggested that the orchid family is not invasive, recent research indicates that the lag time, or deeper effect, that is, the time between introduction and invasiveness, might prove otherwise.

The orchid family (Orchidaceae) is considered by some scientists to contain the most species of all angiosperms (flowering) plant families, currently about 25,000

Arundina graminifolia (photograph by Forest and Kim Starr).

recognized species. Orchids occur on all continents except Antarctica. Although there are species on some Antarctic islands. The distribution and abundance of the orchid family, however, tends to be centered in the tropics. Most orchids are epiphytes, which grow on trees and shrubs, or terrestrial, while some are lithophytes, growing on rocks, and a few are aquatic. Orchids range in size from plants that could fit into a thimble to vines over 100 feet tall.

While orchids have a wide global distribution, they have evolved to become ecologically specialized in terms of their local habitat requirements. There are several ecological traits that have limited orchids to certain habitats. This rapidly-evolving family has formed unique interactions with both pollinators and mycorrhizal fungi, the latter of which have a symbiotic relationship with orchid roots. The pollination trend in the orchid family is towards specialist pollinators. Orchids also require mycorrhizal fungi for seedling development, and in some species this interaction is necessary into adulthood. Because of these relationships, orchids are one of the most specialized flowering plant families. This has tended to limit their invasive tendencies.

However, there is an emerging trend, or perhaps evolutionary adaptation, within the orchid family. Some species, after introduction to an area outside of their na-

Clifford and Kobayashi (2012)

- WRA specialist Patti Clifford gave presentations on the WRA to two Community Gardens and to the Presidents of the Community Gardens on Oahu (http://awcga.org/AWCGA_Invasive.ppt)
- WRA specialist Patti Clifford wrote an article on invasive orchids and the HPWRA (Clifford, P. and Kobayashi, K. 2012. Naturalizing Orchids and the Hawaii Pacific Weed Risk Assessment System. OF-51. University of Hawaii, Honolulu, HI. http://www.ctahr.hawaii.edu/oc/freepubs/pdf/OF-51.pdf)
- WRA specialist Patti Clifford edited six College of Tropical Agriculture and Human Resources publications to include HPWRA information and ratings for screened species

For more information, please contact: hpwra@yahoo.com or visit hpwra.org

Title: Early Detection of Africanized Honeybees and Exotic Honeybee Species
Organization: HDOA, Plant Pest Control Branch, Apiary Program
Award: $14,007.48

Introduction: In Hawai'i, honey bees are needed for honey production, are part of the largest queen bee production operations in the world, and are responsible for the pollination of approximately one third of food crops. In 2007, Hawai'i experienced the incursion of its first serious pest of honeybees – the varroa mite (*Varroa destructor*), generally considered to be most destructive pest of honeybees worldwide. In 2009, the Hawai'i Department of Agriculture received temporary funding through the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) specific to assisting beekeepers in mitigating the impact of varroa mite. In 2011, the State of Hawai'i approved the creation of a permanent (although as yet unfunded) Apiary Program through HDOA. Additional funds, including those granted to the Apiary Program by HISC, have broadened our scope of work to include surveillance for other potential invasive pests of honey bees, including Africanized bees, whose presence in Hawai`i would harshly affect beekeeping industries, tourism, and everyday life for all residents of our state. The Hawai'i Apiary Program is committed to promoting the sustainability of beekeeping in our state, primarily through the distribution of science-based recommendations for hive health and crop pollination needs to beekeepers and growers. Approximately five percent of our total funding needs for FY2012 were supplied with HISC funds.

Achievements in FY12

Placement of swarm traps at high-risk areas: Using information provided by DOT, the Apiary Program has determined all air and sea ports that have the potential to receive commercial cargo. Making use of geographic information systems (GIS) technology, a one-mile radius for swarm trap placement has been created around each of these locations. This strategic placement of swarms traps is allowing for monitoring at 20 high-risk port areas statewide (Figure 1. *Figures in this report are presented in an online supplement at hawaiiinvasivespecies.org/hisc/*).

Apiary Specialist servicing a swarm trap on Moloka'i

Monitor swarm traps on a regular basis: The Apiary Program has three full time staff members (two on Big Island and one on O'ahu). With assistance from HDOA staff on Kaua'i and Maui, we have been able to check swarm traps regularly statewide, resulting in capture and examination of over 30 honey bee swarm over the past year. No new pests have been detected.

Provide training to beekeepers to ID new species: Apiary Program staff gives talks to a variety of audiences, though most often beekeepers. At each talk, emphasis is placed on examination and documentation of hive health – beekeepers are taught that without observation, new problems will not be detected in a timely fashion. Beekeepers are encouraged to contact the Apiary Program immediately with questions and/or concerns about anything unfamiliar that they may observe in their hives. Public talks are ongoing – presentation were held on Kaua'i, O'ahu, Maui, Lana'i, and the Big Island this year. Our voluntary beekeeper registry (currently consisting of 121 beekeepers statewide) has also been a

valuable tool; when we heard rumors that some local beekeepers were interested in acquiring Africanized queens due to their perceived varroa resistance, we were able to quickly disseminate the illegality and immense negative effects of this idea.

Provide education and training to state and federal inspectors and ship based cargo carriers:

- Working with HDOA Plant Quarantine Branch (PQB) inspectors to improve their knowledge and equip them (educationally and materially) to handle swarm calls they may need to deal with.
- Attended meetings of the Hawai'i Risk Assessment Committee in Nov 2011 and Feb 2012 to describe our program and its mission; this committee brings together several agencies, including USDA-APHIS, Department of Homeland Security-Customs and Border Protection, & HDOA-PQB.
- Provided a training session for Customs and Border Protection agents (May 2012)
- Participated in an interview for an DOT airport biosecurity project (Feb 2012)
- In discussion with DOT staff at Honolulu International Airport for placement of swarm traps
- Published information in the employee newsletter at Young Brothers (Figure 2) (Jan 2012)

Develop outreach materials to improve and maintain a high level of awareness of bees and bee pests:

- A website (www.hawaiibee.com) with over 10,000 hits since its launch in Feb 2012.
- Informational emails through our voluntary beekeeper registry.
- A quarterly newsletter (since Jan 2102) that goes out to registrants, always with an article about a pest/disease (Figure 3). Archives are posted on our website.
- Flyer focusing on American foulbrood (Figure 4) and a HDOA New Pest Advisory for small hive beetle (Figure 5).
- The Hawai'i Apiary Program worked with the non-profit Pollinator Partnership to request that Hawai'i join 37 other states across the country to celebrate pollinator week, June 18-24, 2012. On June 18, Governor Abercrombie held a proclamation signing ceremony at the State Capitol to declare the first Hawai'i Pollinator Week (Figure 6).

Other achievements:

- In Sept 2011, the Apiary Program worked with HDOA-PQB on the interception of a swarm of honey bees that was discovered by a trucking company inside a shipping container that had originated in California. The container was fumigated, the bees collected and tested for Africanization.
- Hawai'i has participated for the fourth consecutive year (since its inception) in the USDA Honey Bee Pests and Disease Survey project. This national survey takes 25 samples from across the state and tests for a variety of pests and diseases, some of which are not known to occur in Hawai'i and/or the United States. No new pests have been found in Hawai'i.
- Our staff has arranged to receive local training in morphometric detection of Africanized honey bees from David Barnes, a USDA-certified trainer for Fast Africanized Bee Identification System (FABIS) and USA-ID.
- The Apiary Program hosted Dr. Jamie Ellis, an authority on small hive beetle and Africanized bees, from the University of Florida in February 2012. He spoke to beekeepers on Kaua'i, O'ahu, Maui, and both sides of the Big Island.
- The Apiary Program has assisted two new queen breeders (the first in many years) on Kaua'i and Maui to reach strict certification guidelines, enabling them to ship their certified-healthy queens inter-island and to the mainland.
- The USDA has provided funding for FY13 to increase our swarm trapping efforts and to test all catches for Africanization through Dr. Allen Szalanski at the University of Arkansas.

Title: Ballast water and hull fouling coordinator
Organization: Aquatic Invasive Species Program (DLNR/DAR)
Award: $21,481

Aquatic Invasive Species Program

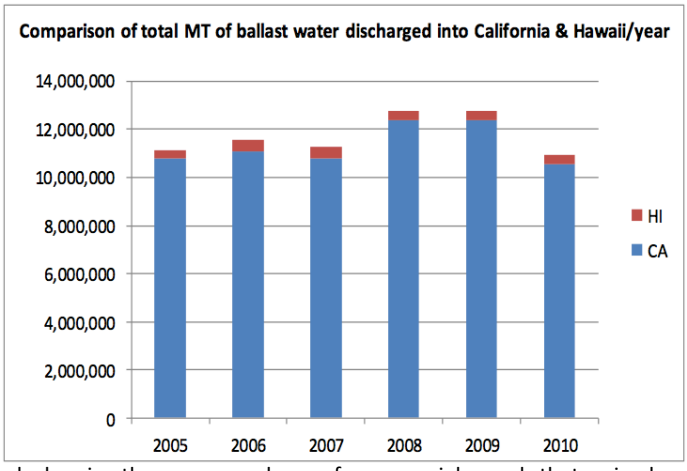
Introduction: The goals of the Aquatic Invasive Species Program of the Division of Aquatic Resources (DAR) are to prevent the introduction and spread of aquatic invasive species (AIS) in the waters of the Main Hawaiian Islands. The Ballast Water and Hull Fouling (BW/HF) coordinator is tasked with developing and implementing strategies relating to AIS risks associated with vessel ballast water and hull fouling, which are considered the strongest vectors for the introduction and spread of AIS.

The total funding need for the BW/HF Coordinator for FY12 was $34,106 (approximately 52% of entire FY funding need) because the position was vacant until December 2011. HISC funds provided 1/3 of the FY12 funding need. This report provides a progress update for tasks completed during Dec11-June12.

Achievements in FY12

Deliverable 1: *Processing ballast water reports 1-2 times per week and improve existing ballast water reporting database.*
Ballast water reports were processed regularly to ensure vessels complied with Hawaii's ballast water administrative rules. The majority of vessels were compliant and did not intend to discharge untreated ballast water. Exceptions included unmanned barges. Improving the reporting database was not achieved in this period.

Deliverable 2: *Develop draft hull fouling management guidelines, produce recommended guidelines and create relationships with shipping industry and harbor masters.*
Relationships were established with representatives from over 17 different stakeholders groups encompassing Hawaii State, federal and Pacific state governments, maritime shipping industries, recreational boat users and scientists. Information gathered from stakeholder correspondence was combined with an analysis of vessel arrival data downloaded from the National Ballastwater Information Clearinghouse (NBIC), and summarized in a draft report (in prep). This produced a preliminary view of the magnitude of the AIS risk posed to Hawaii by hull fouling, and potential partnerships for management. The analysis also identified gaps in the states understanding of hull husbandry activities in Hawaii and the movement of recreational craft. It was recommended that baseline hull husbandry data be collected for all vessels during 2013 to inform policy options for vessel hull fouling management (including possible regulations), and that the Alien Aquatic Organism Task force be re-engaged. These recommendations were supported by DLNR.



Graph showing the average volume of commercial vessels that arrived into Hawaii per year during 2004-2010.

Deliverable 3: *Produce reports with yearly ballast water report statistics.*
Ballast water reporting data was obtained for the period 2004-2010 from the NBIC. Preliminary analysis indicates that Hawaii received 1000 vessel entries/year, the majority of which did not intend to discharge untreated ballast water. It is proposed that this data, including subsequent reports, be collated and presented in a ballast water statistical report at the end of December 2012.

Strategic stakeholder engagement
In early 2012, the BW/HF Coordinator attended the Pacific Ballast Water Working Group meeting in Seattle and presented Hawaii's goals for ballast water and hull fouling management. A strategic partnership emerged with Hawaii, Washington, Oregon, California and Alaskan states informally agreeing to work collaboratively on AIS policy development. A possible memorandum of agreement is under discussion. The coordinator has been invited to present at the California State Land's Commission 'Prevention First Conference' in October 2012, in the state AIS policy session.

DLNR also submitted comments on and support for biofouling regulations under development in the state of California and in Australia. Engagement with New Zealand also occurred, as their draft biofouling regulations continue to progress. California, Australia and New Zealand are the parties most advanced on vessel biofouling policy and in drafting biofouling regulations.

National Ballast Water Regulations
DLNR contributed to DOH's 401 certification submission for the United States Environmental Protection Agencies' (EPA) 'Vessel General Permit for Discharges Incidental to the Normal Operation of Vessels'. DLNR is also keeping a watching brief on a bill introduced in June titled 'Vessel Incidental Discharge Act' that proposes to unify the United States Coast Guard and EPA regulations governing discharges incidental to the normal operation of a vessel in the navigable waters of the United States. Among other issues, this draft Act would restrict the states' ability to impose more stringent BW rules that would allow the protection of unique and threatened state resources.

Other Activities in FY12
Recently it became apparent that Japanese tsunami marine debris (JTMD) is a vector that can contribute to the introduction and spread of non-indigenous aquatic species which have the potential to become invasive. JTMD has begun arriving on the mainland United States and to date a dock covered in AIS beached in Oregon. DAR is engaging in this issue due to the potential of JTMD arriving in Hawaii and has been invited to participate in an AIS JTMD subject matter expert group. This group will develop a regional protocol for AIS response activities relating to JTMD incidents.

Additional Information
Funding for the ballast water and hull fouling program in FY13 has been secured jointly through HISC and Department of Fish and Wildlife Service. Continuation of the program through FY14 is not secured and may require full funding from HISC. The development and implementation of management options for vessel biofouling in Hawaii is forecast to be a long term (5 year) project.

Contact Information

For more information, please contact: Sonia Gorgula at Sonia.gorgula@hawaii.gov

Data analysis for vessels operating in Hawaiian ports

VESSEL TYPE	AVERAGE NUMBER OF ANNUAL ARRIVALS	AVERAGE NUMBER OF UNIQUE VESSELS	AVERAGE ENTRIES PER INDIVIDUAL VESSEL
Container	417	43	9
Passenger	237	25	9
Tanker	168	97	1
Other	98	34	2
Ro-ro	95	42	2
Bulker	39	35	1
General Cargo	25	22	1
Unknown	4	0.5	8
Reefer	1	1.5	1
Combo	0.1	0.1	1

Table 1: This table provides a comparison (by vessel type) of the average annual arrivals, unique vessels and entries/individual vessel for those vessels that entered Hawaiian ports and submitted ballast water reports during 2004-2010. Number of reports is used as a proxy for number of vessel arrivals.

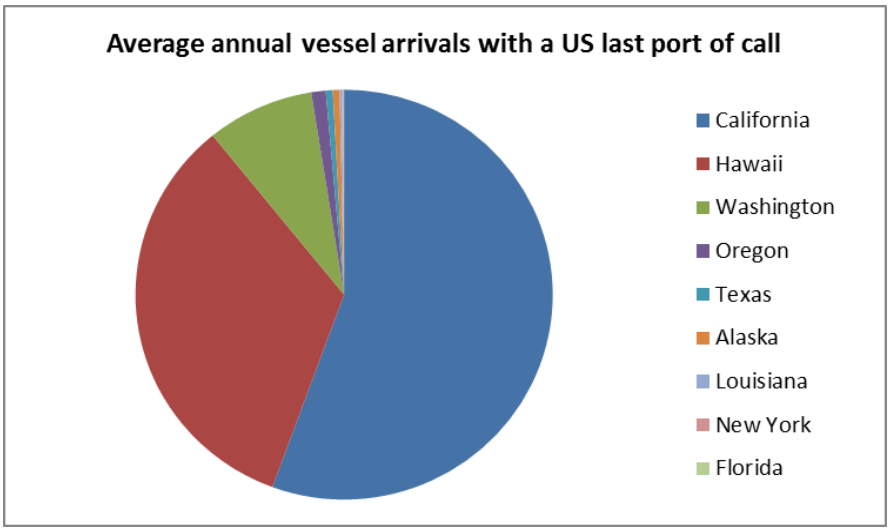


Figure 1: 68% of the average annual vessel arrivals into Hawaii during 2004-2010 came from a U.S. port. This figure shows the states from which Hawaii received vessel arrivals, and the volume.

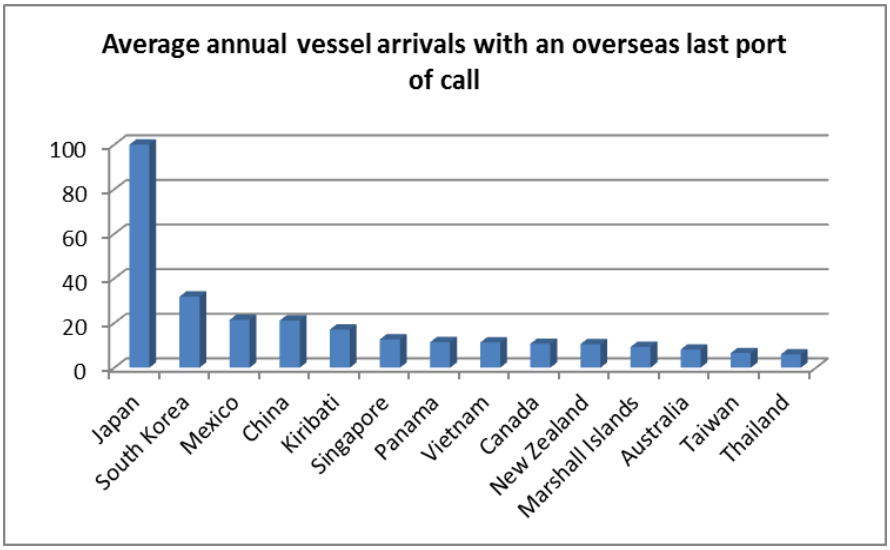


Figure 2: The remaining 32% of average annual vessel arrivals into Hawaii during 2004-2010 came from an overseas port. This chart shows the 15 last ports of call from which most vessels arrived, but during 2004-2010 Hawaii was connected to over 40 different countries.

VI. HISC Response & Control of Established Pests Working Group

Response and Control of Established Pests Working Group Goals

- Review priorities for the control of pests already present or recently arrived in the state
- Implement cost effective eradication and control programs against incipient and established pests with shared resources and shared responsibilities of all agencies.
- A more detailed list of goals is given in the HISC Strategy 2008-2013.

Miconia, *Miconia calvescens*

Funded Projects for FY12

The lead agency for the Response and Control of Established Pests Working Group (also referred to as simply the Established Pests Working Group) is DLNR. In FY12, the Established Pests Working Group funded eight projects, totaling $1,215,213:

1) *HDOA Biocontrol Foreign Exploration*, HDOA: $40,000
2) *Detection and Control of Invasive Species in Kaua'i County,* Kaua'i Invasive Species Committee: $211,857
3) *Detection and Control of Invasive Species on O'ahu Island*, O'ahu Invasive Species Committee: $208,042
4) *Detection and Control of Invasive Species in Maui County*, Moloka'i and Maui Invasive Species Committees: $180,000
5) *Detection and Control of Invasive Species in Hawai'i County*, proposed by the Big Island Invasive Species Committee: $205,000
6) *Aquatic Invasive Species Team*, proposed by DAR, DLNR: $207,531
7) *Big Island Axis Deer Project*, Big Island Invasive Species Committee: $90,000
8) *Control of Little Fire and Emerging Pest Ant Species in Hawai'i*, HDOA, $72,783

Key Activities in FY12

- Eradication of coqui frogs from Kaua'i by the Kaua'i Invasive Species Committee
- Capture of the first two live mongoose on Kaua'i
- Dispatch of the first axis deer on Hawai'i Island
- Registration of a new bait/pesticide matrix for Little Fire Ants
- Collection of new prospective biocontrol agents from Africa by HDOA's exploratory entomologist
- Coqui frog and miconia kept from establishing on O'ahu
- Little Fire Ant detected and controlled on Maui

Title: Biocontrol Foreign Exploration Final Report
Date: September 1, 2012
Organization: HDOA
Award: $40,000

Introduction: The Plant Pest Control Branch of HDOA is dedicated to the control of invasive pest species that threaten the environment and agricultural industries of Hawai'i. Key components to fulfill this mission are pest detection programs, taxonomic identification programs, and rapid response and biological control programs. The Plant Pest Control (PPC) Branch is unique in Hawai'i as it engages in classical biological control of weed and arthropod pests.

Achievements in FY12

Natural Enemy Collection: HISC funding was utilized to send PPC Exploratory Entomologist Mohsen Ramadan to Africa. While in Africa, the following pest species were targeted:

- *Senecio madagascariensis,* Fireweed
- *Pennisetum setaceum,* Fountain Grass
- *Hypothenimus hampei*, Coffee Berry Borer
- *Athenia tumidia,* Small Hive Beetle

Senecio madagascariensis or fireweed, a serious range land pest and target for biocontrol

The three month exploration included collection trips in South Africa, Swaziland, Tanzania, and Madagascar. The trip was extremely productive with insect natural enemies collected for everything but the small hive beetle. Unfortunately, no diseases were collected.

Natural Enemy Evaluation:

All nine agents collected for fireweed were suitable for evaluation based on field observations and previous work. Based on biology and long term strategizing, the following natural enemies were selected for further testing:

- *Gasteroclisus*, a stem boring weevil
- *Pycitodes* sp., a flower feeding moth
- *Secuio extensa* will undergo additional host range testing against various sunflower cultivars used in Hawai'i.

Feeding damage of Gasteroclisus on fireweed

Also undergoing evaluation are the following:

- A chrysomelid beetle feeding on skunk-vine, *Paederia foetida.* Testing is approximately 40% complete.
- *Aprostocetus nitens,* a predator of the Erythrina Gall Wasp (EGW), *Quadrastichus erythrinae.* Testing has been temporarily suspended although it can be quickly completed as competition studies with *E. erythrinae* is the only testing that needs to be evaluated.

Colonies of six other insect species are being maintained for future evaluation.

Environmental Assessments: No new environmental assessments were produced, however, progress has been made towards obtaining a permit for the release of a defoliating caterpillar of fireweed, *Secusio extensa*.

Natural Enemy Release: In conjunction with the United States Forest Service, *Tectoccocus ovatus*, a scale insect which attacks the strawberry guava, *Psidium cattleniaum* was release on Hawai'i Island in the Volcano region. Multiple releases have been conducted and it appears that the scale insect has become successfully established.

Other Activities in FY12

Post-release monitoring of *Eurytoma eryrthrinae*: Funding was used to conduct post release monitoring of *E. erythrinae* for evaluating its ability to control the EGW. It appears that this wasp predator has been successful in controlling EGW on existing trees. However, it continues to negatively impact flowers and seed set. In conjunction with insects that attack Erythrina seeds, the long-term future of *Erythrina sandwicensis* requires close monitoring to determine if seed borer parasitoids or a second natural enemy against EGW needs to be released.

Post-release monitoring of *Aprostocetus nitens*: Funding was utilized to conduct field release monitoring for the wasp parasitoid, *A. nitens* against the stinging nettle caterpillar, *Darna pallivitta.* This natural enemy has proven to be highly successful and has established quickly, spread quickly and has been highly effective in controlling well-established populations of the stinging nettle caterpillar. A hyper-parasitoid was found attacking it but at levels that are insignificant.

Additional Information

No additional funding from the HISC was pursued for FY13 for the biological control program as existing funding from other sources meets current capacity needs. However, the following gaps have been identified:

Increased Staffing Capacity: Half-way through the African Exploratory Trip, it became apparent that existing staff was insufficient for the work load of running existing programs, handling incoming insects, establishing the new insects and conducting evaluations. One technician was re-allocated at 70% FTE to assist with the work. In addition, approximately 10 to 12 hours of overtime work per week is needed to conduct the experiments. In a programmatic evaluation, it was determined based on these numbers and examining existing limitations that one additional entomologist and two technicians would allow for maximal use of existing facilities.

Facility Needs: The current facilities for biocontrol are antiquated. The plant pathogen facility, the only of its kind in the state, is in serious need of repairs and is currently undergoing capital improvements to its air handling systems. The engineers, however, have identified serious design flaws that have impacted the ability to maintain stable temperatures and humidity within the facility. The insect containment facility is of an "open" design format with a heavy emphasis on primary containment. This design does not allow for isolation of projects, thereby increasing the risk of cross contamination of experiments. Like the pathogen facility, there is considerable variability in temperature and humidity. New facilities are needed for both insect and pathology containment. Based on recent new facilities

constructed on the mainland an initial evaluations by HDOA staff, a new containment facility would cost approximately $20 million and will allow up to 10 projects to be run simultaneously. This will also allow for the use of natural enemy species which are currently not approved for testing in existing facilities.

Long term, stable funding for Classical Biocontrol: Classical biocontrol requires a stable source of funding. In recent years, funding for foreign exploration, natural enemy evaluation and post-release monitoring has been heavily dependent upon special funds. Dedicated funding between $75 to 100K a year will allow for 1 foreign exploration trip, equipment and supplies for host range testing and interisland trips for staff to conduct field releases and post release monitoring.

Contact Information: Neil Reimer, Plant Pest Control Manager, 973-9522 or neil.j.reimer@hawaii.gov

Title: Detection and Control of Invasive Species on the Island of Kaua'i
Organization: Kaua'i Invasive Species Committee (KISC)
Award: $211,857

In FY 2012, KISC continued working on goals outlined by the HISC Established Pest Working Group Strategic Plan. Priority was given to island-wide early detection, rapid response, and control of various plants, vertebrates, and insect targets.

KISC's HISC award leveraged funding from the United States Forest Service, United States Fish and Wildlife Service, Naval Facilities Engineering Command, and Kaua'i County totaling an additional $215,000. High profile targets included ongoing miconia control, little fire ant surveys, eradication of Kaua'i's one known population of coqui frogs, and capturing the first mongoose on Kaua'i.

Achievements in FY12

Number of species detected and evaluated for feasibility of eradication:
Early detection of incipient invasive species included roadside surveys, private property surveys, as well as surveys at nurseries, ports, green-waste areas and resorts.

- 19 species were surveyed for feasibility of eradication with over 270 acres surveyed.
- One species, *Clerodendrum macrostegium* (glory bower), was deemed a feasible target and 182 plants were controlled.
- Little fire ant surveys were conducted covering 34 acres with no new introductions found.

Glory bower with velvet leaves

Number and area of priority invasive species eradicated and/or controlled:
Control and eradication efforts centered on 7 priority plant species and two vertebrate species, coqui frog and mongoose.

- Survey and control of Miconia was focused on three primary areas of the Wailua District; Wailua River State Park (WRSP), Wailua Homesteads, and the Game Management Area (GMA) in the Halele'a Forest Reserve. 173 acres were ground surveyed with 1 mature plant and 82 immature plants treated. Eradication strategies dictate the importance of removing plants before reaching maturity; current data suggests that these strategies are working. Aerial surveys were also conducted in the GMA utilizing Herbicide Ballistic Technology. One mature and 24 immature plants were discovered and treated from the air.
- During this reporting period, 551 acres were aerial-surveyed for cattails.
- Other priority plant targets included Arundo, ivy gourd, false kava, long thorn kiawe, and other miscellaneous species. Over 6,288 acres were surveyed and over 8,944 individual plants were treated.
- KISC was successful, during this period, in eradicating Kaua'i's one population of coqui frogs and continues to be the primary responder for new introductions.
- In May and June of 2012, KISC was credited with capturing Kaua'i's first and second mongoose ever. Over 1, 43 hours were expended on this target including partnership hours.

Prioritization processes identified and in place:
Each year, KISC conducts annual prioritization meetings with the committee as a whole. Target activities are reviewed and new species are evaluated for feasibility of control. There are many factors that dictate prioritization of KISC targets including: acres of infestation, the Hawai'i-Pacific Weed Risk Assessment (HP-WRA) ranking, difficulty of control, number of property owners, and estimated cost of control.

Overall effort expended
Table 1 reflects overall effort expended on all target species.

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

- Target species are chosen for the threat that they pose to Kaua'i County's high-value natural areas or to agricultural production. According to United States Fish and Wildlife Service, Kaua'i's high rate of endemic plants (224; the highest in the Hawaiian archipelago and quite possibly in the world) make it a biodiversity hotspot of global magnitude. Kaua'i has over 116 endemic species listed as endangered or threatened.
- Priority is given to high-value native ecosystems; such as the Halele'a Forest Reserve where miconia operations take place.
- KISC also works closely with the agriculture community; keeping them informed as to threats to their commodities and what to watch for; such as the stinging nettle caterpillar, and little fire ant.

Mature male mongoose captured on Kaua'i

Other Activities in FY12:

Capacity development: One additional field worker was hired with support from the United States Fish and Wildlife Service, joining a team focused on early detection of invasive invertebrates. Overall staff capacity was enhanced by participating in the following training events: CPR & 1st Aid classes and certification, Basic Aviation Safety Training, IACUC Training and Certification, and Trimble training.

Partner collaboration: KISC continued to work closely during FY2012 with the Pacific Missile Range Facility, UH-CTAHR, DLNR-DOFAW, The Nature Conservancy, HDOA, USDA, and United States Fish and Wildlife Service.

Contact Information

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Table 1 – KISC Target Species Activity FY2012

Species Name	Acres Surveyed	Mature Controlled	Immature Controlled	KISC Work Hours
Alstonia macrophylla	2	0	0	10
Angiopteris evecta	0	1	0	4
Arundo donax	96	174	0	211
Bishofia javanica	8	0	0	8
Calotropis gigantean	2	0	101	24
Coccinia grandis	238	157	1,066	473
Cissus nodosa	23	0	77	41
Cissus verticillata	114	50	0	105
Clerodendrum macrostegium	25	137	45	131
Cryptostegia madagascariensis	42	0	0	77
Dellenia suffruticosa	10	1	0	40
Eleutherodactylus coqui	1,209	2	0	477
Herpestes auropunctatus	n/a	1	1	930
Ligustrum sinense	5	0	0	6
Macaranga mappa	1	1	0	14
Miconia calvescens	1,022	2	106	387
Miscellaneous species	2,460	0	0	272
Morella cerifera	4	0	1	52
Paraderris elliptica	1	0	0	4
Pennisetum setaceum	4	4	50	25
Pennisetum villosum	3	0	0	10
Pereskia aculeata	4	0	20	25
Piper auritum	28	4,057	0	595
Prosopis juliflora	161	15	1,254	330
Rubus sieboldii	10	0	0	18
Senecio madagascariensis	2	0	0	8
Tamarix aphylla	13	4	3	83
Typha latifolia	753	364	0	247
Wasmannia auropunctata	34	n/a	n/a	275
Totals	**4,505**	**4,970**	**2,724**	**4,882**

Title: O'ahu Island Invasive Species Detection and Control
Organization: O'ahu Invasive Species Committee
Award: $ 208,042

Introduction: Ten years ago, the O'ahu Invasive Species Committee (OISC) was founded by a group of volunteers concerned about the spread of miconia and fountain grass on O'ahu. These pests had already wreaked havoc on other islands' ecosystems, but were only just beginning to work their way into the farms and forests of O'ahu. Since then OISC has worked to prevent ecosystem-changing invaders from damaging the forests, watersheds, agricultural systems, economy and quality of life on O'ahu through on-the-ground fieldwork and public education and outreach. HISC supplied 32% of OISC's total budget for 2012. The rest of OISC's budget was leveraged with federal sources and other state sources.

Achievements in FY12

Priority invasive species eradicated and/or controlled

To make the most of limited resources, OISC focuses its activities where there is the greatest return for the effort invested, working to stop invasive species before they become established. OISC's partners and steering committee choose those species that have the potential to disrupt vital ecosystem services, threaten Hawai'i`s food sustainability or severely degrade the quality of life on O'ahu. In 2012, OISC continued to stop the spread of an erosion-promoting tree, prevented a population of coqui frogs from naturalizing on state lands in Waimānalo, performed early detection for little fire ant, and controlled a rangeland weed that is toxic to livestock.

OISC field crew removing a mature miconia tree from a steep slope in Makiki Valley

Specific accomplishments from January 1, 2012 include:

- Surveyed 2,468 acres and removed 3 mature and 708 immature miconia (*Miconia calvescens*) trees from the southern Ko'olau Range, preventing this species from expanding into O'ahu's watersheds.
- Removed 19 coqui frogs from around O'ahu in cooperation with the Hawai'i Department of Agriculture.
- Conducted surveys for little fire ant at 45 sites around O'ahu in cooperation with HDOA. None have been found. Early detection will be the key to eradication of this stinging ant.
- Prevented cane ti (*Tibouchina herbacea*) from spreading along the northern Ko'olau summit.
- Completed removal of O'ahu's only known infestation of Cape Ivy (*Delairea odorata*). The area is located in the mid-elevation forest of the Wai'anae Mountains.
- Removed 582 Himalayan blackberry plants over 39 acres in Pālolo. The infestation area is in the transition zone between disturbed and mostly native forest. OISC's work here protects the native forests at the summit of the Ko'olau Range.
- Removed 1,769 lasiandra plants (*Tibouchina urvilleana*) from state forest reserve land within the Mānoa trail complex. All other known sites are monitored and controlled by OISC—preventing this state-listed noxious weed from establishing.
- Removed 37 ornamental pampas grass plantings from golf courses and private residences. Pampas grass is a priority for OISC because it can form dense thickets with ample fuel for brush fires. It is important to remove this species from cultivation because it disperses easily into natural areas by

wind. On O'ahu, OISC has removed pampas grass the summit of the Ko'olau Range and from the forests of Kīpapa Valley.

- Worked with Lyon Arboretum to remove a highly invasive species—spiked pepper (*Piper aduncum*) from the Lyon collection and to survey the Arboretum grounds to control plants that have spread from the original display.
- Conducted surveys and control on public and private land for Siam weed (*Chromolaena odorata*)—in cooperation with the O'ahu Army Natural Resources Program. Siam weed is a major pest on Guam and is toxic to livestock.

Prioritization processes identified and in place:
The O'ahu Early Detection (OED) program was formed in 2006 as a collaboration between the O'ahu Invasive Species Committee and the Bishop Museum in response to the need for island-wide, comprehensive data on newly introduced invasive plants to support rapid response control programs. OED documents newly introduced plant species and assesses the threat of invasiveness of introduced plants to Hawai'i's environment and agriculture and the feasibility of eradication and control given the species' distribution.

OED's work ensures that public dollars supporting invasive species control are used efficiently and effectively by helping agencies prioritize species and set realistic goals. In 2012, the O'ahu Early Detection program continued its partnership with the island's botanical gardens to survey their collections and alert the managers to species that may be spreading or potentially invasive. OED uses a combination of collection records and on-the-ground surveys for this work.

Species detected and evaluated for feasibility of eradication:
In 2012, OED identified and assessed 92 plant species. Many of these were found on OED surveys but a significant number also came as submission from partners and the public. Of these, seven represented new state records, 13 were new naturalized records, and 10 were new island records.

Species, habitats, ecosystems, agricultural, and managed areas protected because of control efforts.
In FY12, OISC's ongoing miconia work protected the important watershed functions of the Ko'olau Range. The entire Ko'olau Range provides good habitat for miconia and once it takes over, miconia's shallow root system can increase erosion. The northern Ko'olau forests and the agricultural areas of Kahuku are protected from Siam weed. OISC's partnership with HDOA protected the Waimanālo area from a coqui frog infestation that would have been uncontrollable, had the animal established itself on the vertical valley walls. The native forests of the summit and the future Poamoho Natural Area Reserve are protected from cane ti infestations due to the efforts of OISC and its partners. OISC's work with miconia, lasiandra and spiked pepper protect Mānoa Valley and the extensive trail complex there. The dry forests and endangered species of the Wai'anae summit are protected from *Delairea odorata*, a vine that plagues the upper-elevation forests of the Big Island. Finally, OISC is protecting the quality of life in residential and agricultural areas by aggressively looking for little fire ant.

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Title: Detection & Control of Invasive Species in Maui County
Organization: Maui Invasive Species Committee
Moloka'i Invasive Species Committee
Award: $215,000

Introduction: The Maui Invasive Species Committee (MISC) and Moloka'i Invasive Species Committee (MoMISC) are projects of the Pacific Cooperative Studies Unit, University of Hawai'i. MISC and MoMISC have a combined experience of more than twenty years working to identify and remove highly invasive plant and animal species that threaten Maui County's watersheds, agriculture, economy, and quality of life. Total project funding for FY2012 was $2.4 million. The HISC provided $235,000 in project support, or slightly less than 10%. HISC and other state funds ($20,000) were matched 9:1 with support from county, federal, and private sources.

Achievements in FY12

MISC and MoMISC implemented island-wide cost-effective detection and control strategies targeting a suite of invasive species. Partner collaboration was critical to project success.

Controlling pampas grass in the East Maui Watershed

Implementation of priority-setting process: Choosing target species for control work was based on the following factors: threat to the environment and economy, feasibility of control, and cost of control. Committee members, comprised of local resource managers, scientists, and agency representatives, held annual priority-setting workshops, which formed the basis for survey and detection work. MISC held six meetings to set and review priorities for the control of invasive species in Maui County; MoMISC held four meetings. Meeting topics focused on overall progress; vertebrates; biocontrol; plant assessments; outreach and education; and benchmarks for pampas grass.

Evidence of meaningful participation by partner agencies: Total contributed hours (minimum estimate) field work (851); committee participation (240). Staff from partner agencies assisted with field work, aerial control missions, and vertebrate and ant control operations. Strong funding support from county and federal agencies also evidences meaningful participation.

Number of species detected and evaluated for feasibility of eradication: 57. Staff conducted surveys and reviewed data from previous roadside and nursery surveys and compiled a list of plant species to assess feasibility of eradication. Species were evaluated using the Compendium of Weeds, the Hawai'i-Pacific WRA protocol, delimitation surveys, and expert input.

Number of species targeted for detection and control activities: 28 species, including 22 plant species, 3 vertebrate species, 1 invertebrate (little fire ant), 1 invasive jellyfish, and 1 plant disease (BBTV). See Table 1.

Number of individual targets detected and controlled: 67,481 plants; 7 mitred conures, thousands of coqui frogs; 22 upside-down jellyfish, and 14,505 infected banana plants.

Number of acres surveyed and acres treated: A total of 38,978 acres were surveyed for invasive plants; 7.6 acres treated. Staff also conducted surveys for little fire ant on Maui (108 sites) and Molokaʻi (419 acres) and veiled chameleons on Maui (22 sites) with no detections.

MoMISC staff: weed control and restorative planting at Kalaupapa National Park, Molokaʻi

Progress on reducing numbers of widespread vertebrate pests: Throughout FY2012, the MISC Manager facilitated the Maui Deer Working Group, comprised of local farmers, ranchers, hunters, and state and local agency personnel. The group developed a comprehensive island-wide management plan for axis deer. MISC and MoMISC eradicated numerous small populations of coqui frogs on Maui and Molokaʻi.

Status of coqui frog populations on state lands: The densest population of coqui frogs in Maui County is on Maui's north shore in Māliko Gulch with half the gulch on state lands. MISC implemented a multi-pronged control strategy in the gulch, incorporating high-volume sprayers, a gravity-fed power-hose system, and hand capture. This will be a multi-year effort.

Overall effort expended: 10,696 hours by MISC and MoMISC field staff, volunteers and partner agencies: 9,584 (Maui), 428 (Molokaʻi), 684 (Lānaʻi).

Overall population trend for each target species: All targeted species exhibit a downward trend based on one or more of the following measurables: number of individuals detected and controlled; number of mature plants removed; or acres infested, with the exception of *Miconia calvescens*; miconia is in containment status in East Maui.

Presentation of results at professional conferences: Staff gave oral or poster presentations on project strategies and accomplishments at the Hawaiʻi Conservation Conference, Western Association of Weed Science, and Society of American Foresters.

Other Activities in FY12

Other Species: MISC and MoMISC conducted detection and control work on an additional 13 invasive species (11 plants, 2 vertebrates).

Capacity building: MISC and MoMISC staff are highly trained. Additional or refresher training during FY2012 included: Little fire ant identification and survey techniques; enhanced skills with Geographic Information Systems (GIS); plant identification; pesticide use; helicopter operations; and CPR/First Aid.

Journal Club: MISC initiated a "Miconia Journal Club" which meets every few months to review and discuss recent literature related to miconia as a way to ensure that ongoing operations take full advantage of developments elsewhere in the world.

Herbicide Ballistic Technology: MISC is cooperating with Dr. James Leary from the University of Hawai'i to incorporate use of paint ball technology to deliver herbicide in hard-to-reach areas, both on the ground and using helicopters. This technique is proving highly effective for miconia and pampas grass in certain areas.

Collaboration: MISC and MoMISC staff participated in local and state-wide organizations focused on protecting important conservation and agricultural lands in Hawai'i. Staff served on the Legacy Land Commission, Moloka'i Planning Commission, Coordinating Group on Alien Pest Species steering committee, Maui Axis Deer Working Group, the Maui Conservation Alliance and other community organizations. MISC and MoMISC hosted the State Finance Committee for a miconia overflight tour in Hāna, and also hosted the Hawai'i Invasive Species Council for its first-ever neighbor island meeting.

Contact Information

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Hawai'i Invasive Species Council meeting on Maui

Table 1. MISC and MoMISC Invasive Plant Activity – FY2012

Island	Invasive Plants	Acres Surveyed	No. Controlled	Total Hours
Maui	*Coccinia grandis*	2,996	1,142	824
	Cortaderia spp.	24,425	3,910	3,063
	Cryptostegia grandiflora	20	0	5
	Macaranga mappa	4	0	1
	Maclura pomifera	8	77	5
	Miconia calvescens	5,191	59,985	5,327
	Pennisetum setaceum	480	1,283	238
	Pittosporum undulatum	20	5	6
	Pittosporum viridiflorum	97	28	14
	Silybum marianum	219	89	101
Molokaʻi	*Arundo donax*	2	0	12
	Cryptostegia madagascariensis	43	32	38
	Cyathea cooperi	49	5	28
	Falcataria moluccana	24	0	32
	Ficus religiosa	43	36	28
	Merremia tuberosa	4	14	4
	Miconia calvescens	3,348	0	22
	Pennisetum setaceum	64	0	6
	Pereskia aculeata	24	104	19
	Phormium tenax	117	432	106
	Prosopis juliflora	100	67	95
	Rosa multiflora	6	12	6
	Salsola kali	167	44	25
	Ulex europaeus	23	0	8
Lānaʻi	*Coccinia grandis*	714	104	73
	Pennisetum setaceum	790	112	453

Title: Detection and Control of Invasive Species on the Island of Hawai'i
Organization: Big Island Invasive Species Committee (BIISC)
Award: $205,000

In FY 2012, BIISC continued working on goals outlined by the HISC Established Pest Working Group Strategic Plan. Priority was given to island-wide early detection, rapid response, and control of various plants and vertebrate targets.

BIISC's HISC award leveraged funding from the US Forest Service, United States Fish and Wildlife Service, Malama O Puna, and Wao Kele O Puna totaling an additional $410,920. Priority work included ongoing miconia control in Wao Kele O Puna, targeted coqui frog control, early detection surveys, and monitoring and control of priority species.

Achievements in FY12

Number of species detected and evaluated for feasibility of eradication:
Early detection of incipient invasive species included surveys of: roadsides, private property, nurseries, resorts and botanical gardens.

- 28 plant pest species found on roadside surveys were evaluated for feasibility of control.
- 5 species chosen to further evaluate with delimiting surveys
- 450 miles of roads surveyed for incipient weeds


Clearing Miconia calvescens in Honoka'a

Number and area of priority invasive species eradicated and/or controlled:
Control and eradication efforts centered on 6 priority plant species *(Buddleja madagascariensis, Cortadera jubata, Cryptostegia madagascariensis, Miconia calvescens, Morella cifera, Pereskia aculeate),* and three vertebrate species *(Chincilla lanigera*, *Oryctolagus cuniculus* and *Eleutherdoactylus coqui*).

- Ongoing survey and control of Miconia focused in the forest of Wao Kele Puna and Waipio Valley. BIISC hopes to "contain" the spread of miconia to the North districts of the Big Island. During this reporting period over 1,746 acres were surveyed by air and ground. 19 mature and 40 immature plants were controlled.
- Survey, control and monitoring of other plant priority species covered over 2,135 acres and resulted in the control of 2,284 plants.
- Vertebrate crew surveyed over 4, 071 acres for chinchilla and feral rabbit and treated over 45 acres for coqui frog.

Prioritization processes identified and in place:
Each year, BIISC conducts annual prioritization meetings with the committee as a whole. Target activities are reviewed and new species are evaluated for feasibility of control. There are many factors that help in the prioritization of BIISC priority targets including: proximity to high value native forests, acres of infestation, feasibility and cost of control, the Hawai'i-Pacific Weed Risk Assessment (HP-WRA) ranking, and number of property owners.

Overall effort expended:
Table 1 reflects overall effort expended on all target species.

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

- The Island of Hawaii has extraordinary natural resources, from mauka to makai, with over 70 threatened or endangered plants, 28 threatened and endangered animal species, and thriving agricultural and floricultural industries. Invasive species pose one of the greatest threats to the long-term viability of native ecosystems and agriculture. During this reporting period BIISC's island wide early detection surveys covered over 450 miles of road through all habitats, ecosystems, agricultural and managed protected areas for incipient pest species.
- BIISC also works closely with and supports partner agencies to fill gaps of invasive species control work in their managed areas such as the ongoing miconia control efforts in Wao Kele O Puna Forest.

Other Activities in FY12:

Capacity development: Three intermittent workers were hired with support from the United States Fish and Wildlife Service to assist with education, outreach, and water quality testing. Overall staff capacity was enhanced by participating in the following training events: CPR & First Aid classes and certification, Basic Aviation Safety Training, IACUC Training and Certification, and All-Terrain Vehicle training.

Partner collaboration: BIISC continued to work closely during FY2012 with the UH-CTAHR, DLNR-DOFAW, The Nature Conservancy, HDOA, USDA, and United States Fish and Wildlife Service.

Contact Information

For more information, please contact: Lori Buchanan, BIISC Acting Manager, lbuchanan@tnc.org (808)-933-3340, www.biisc.org

Table 1 – BIISC Target Species Activity FY2012

Species Name	Acres Surveyed	Mature Controlled	Immature Controlled	BIISC Work Hours
Buddleja madagascariensis	12	485	356	480
Chinchilla lanigera	2,403	0	0	107
Cortaderia jubata	.03	7	0	32
Cryptostegia madagascariensis	53	161	358	367
Eleutherodactylus coqui	46	2	0	75
Falcateria moluccana	2,702	15	0	41
Fulica alai *	13	0	0	75
Herpestes auropunctatus	6	0	0	18
Miconia calvescens	1,746	19	40	190
Morella cerifera	297	39	106	244
Oryctolagus cuniculus	1,668	0	0	173
Pennisetum setaceum	.03	58	1	17
Pereskia aculeata	1	30	25	64
Rauvolfia vomitoria	214	585	132	180
Rhizophora mangle	11	1	525	27
Rosa laevigata	.2	11	23	39
Rubus ellipticus	7	0	230	20
Ulex europaeus	325	5,884	18,610	559
Verbascum Thapsus	1	0	36	18
Total	**9,505**	**7,297**	**20,442**	**2,726**

Title: Aquatic Invasive Species Management and Control
Organization: Division of Aquatic Resources
Award: $207,531

Introduction: The mission of the Hawaii Division of Aquatic Resources (DAR) is to manage, conserve and restore the state's unique aquatic resources and ecosystems for present and future generations. More specifically, the DAR Aquatic Invasive Species (AIS) program is focused on the management, control, and prevention of aquatic invaders throughout the Hawaiian Islands. The AIS team focused its efforts on the control of alien invasive algae in Kaneohe Bay, Oahu. Our total funding need for FY12 was $711,214, of which HISC provided $207,531, with NOAA and the United States Fish and Wildlife Service providing the remainder.

Achievements in FY12

1. Approximately 51,288 square meters (13 acres) across three patch reefs (Reefs 26, 27, 29) were proposed to be cleared of invasive algae (*Gracilaria, Kappaphycus, Eucheuma*) using the Super Sucker. Because baseline monitoring surveys were not yet completed, algal removal on Reef 26 did not begin until November, 2011. The reef was divided into plots to allow for systematic removal and efficient monitoring of quantity of algae removed. Removal time was further limited due to extreme low tides during day light hours. Algae removal on Reef 26 was completed the middle of March, 2012 with a total of 11,053 pounds of algae removed. Removal of invasive algae began on Reef 27 in late March and will be completed by the end of August, 2012 with a total of 10,745 pounds of algae removed so far. Once Reef 27 is complete, the Super Sucker barge will begin removal efforts on Reef 29, which is the largest of the three reefs at 30,000 m^2.

2. After clearing patch reefs, hatchery raised juvenile collector sea urchins (*Tripneustes gratilla*) were released onto each cleared reef to provide long-term low-maintenance biocontrol.
Modifications were made at the DAR sea urchin hatchery located at Anuenue Fisheries Research Center that increased larval survival and competency by an order of magnitude (from 1000's to 10,000's per tank. Twelve spawning events were conducted during this period with mixed results (see obstacles below).

New nursery systems were designed to decrease overcrowding, which included repairs to multiple 17' round tanks, an increase in the number of urchin settlement units, and development and implementation of the new urchin nursery down-weller systems used for grow out. Improvements were made to nursery systems that increased harvest procedures and efficiency. This reduced time out of the water and stress to juvenile urchins in transit from Sand Island to Kaneohe Bay.

Hatchery raised native collector urchin eating invasive seaweed in Kaneohe Bay, Oahu.

As a result of new hatchery procedures and new nursery systems, survival numbers have steadily increased. To date, 30,721 sea urchins have been released on Reefs 26 and 27 and these reefs will continue to be stocked until our goal of 2 urchins/m^2 is achieved. Once attained, algae/urchin coverage will be assessed to determine if additional urchins are necessary.

Obstacles or Delays*:*
Late autumn and winter spawns yielded sub-par results. Nutrition, egg quality and overall fecundity may be linked to seasonal environmental changes. Spawning and larval rearing activities continue to test if this is true. December spawns metamorphosed, but settlement numbers were considerably lower than the September and October spawns. January spawns showed similar results with a reduced number of settling urchins.

In addition, settlement rates of post-larval *T. gratilla* are highly variable. The reason for this variability is not yet known. Researchers have informally discussed a variety of causes including temperature, water quality and nutrition at various life stages. While the Anuenue team has been able to achieve production success, this post-settlement mortality still presents a significant bottleneck. Some attempts have been made at solving the challenges associated with this life phase.

Due to their small size at the time of outplanting, another challenge is to determine the amount of mortality that occurs in the field. They are very cryptic and can easily hide in small holes and crevices, therefore conducting thorough counts are a challenge. Furthermore, the patch reefs where urchins are transplanted are very large and it is not feasible to conduct an urchin count of the entire reef; survey methods to sub-sample the reef are being developed to get a better estimate of urchin density/mortality.

3. Baseline and quarterly monitoring will measure the success and sustainability of the project.
The field team assisted the Kaneohe Bay Monitoring Coordinator to research, test, evaluate, refine and implement new field survey methods for fish, benthos, echinoderms and rugosity. Each reef is stratified by habitat (reef crest, reef flat - consolidated, reef flat - mixed), randomly allocated using GIS and fixed transect were installed on 5 study patch reefs in Kaneohe Bay. The 5 reefs will be surveyed quarterly for fish, benthos and echinoderms on the fixed transects.

Other Activities in FY12
The AIS team partnered with the University of Hawaii Cooperative Fisheries Unit (Friedlander Lab) to conduct fish and benthic surveys on Lanai's east shore. The project objective was to assess marine resources for a community based conservation project, funded by the Hawaii Fish Trust and Conservation International. Surveys were conducted to characterize the fisheries, benthic, and algal communities around Maunalei-Lanai. This was a good opportunity for the AIS team to partner with other Hawai'i researchers and conduct a baseline assessment of aquatic invasive species threats on Lanai. Invasive algae coverage was very sparse with low levels of *Acanthophora specifera* and a few instances of *Hypnea cervicornis*. A full report is due out in October, 2012

The AIS Coordinator worked collaboratively with representatives from state and federal agencies and Non-governmental Organizations (NGOs) in order to provide review and comments for the new Department of Health rules as they relate to pesticides for invasive species control. Those rules are awaiting signature. Consulted with ISC leaders, United States Fish and Wildlife Service, UH Law School, and invasive species managers to develop a list of policy recommendations that would increase Hawaii's effectiveness at preventing unwanted introductions.

For more information, please contact: Jono Blodgett, Aquatic Invasive Species Program Leader, Division of Aquatic Resources, jb88@hawaii.edu.

Title: Big Island Axis Deer Project
Organization: Big Island Invasive Species Committee
Award: $90,000

Introduction: Axis deer present a huge threat to agriculture, watershed health, and human safety on the Big Island. Current estimates for axis deer are as low as 30 animals, indicating that there is a narrow window of opportunity to prevent the economic and ecological damage already suffered by neighboring islands where deer populations may no longer be eradicated. The goal of this project is to support the second of a projected seven-year campaign to eradicate axis deer from the island.

BIISC's HISC award leveraged funding from DOFAW Special Funds and United States Fish and Wildlife Service totaling an additional $107,772. Total expenses for FY 12 were $197,772. Our single guiding goal is 100% eradication of the invasive deer positively identified.

Achievements in FY12

Confirmed Presence Of Axis Deer: The Invasive Deer (ID) Team was able to confirm the presence of deer on April 11th 2012.

Dispatch Invasive Deer- To date 100% of deer detected have been removed (3).

Train Interagency Task Force: The Invasive Deer Team was able to plan and execute a comprehensive four-day axis deer training on the island of Molokai. The focus of the training was axis deer dispatch and land certification as well as bovine tuberculosis training. 26 individuals attended from 5 different partner agencies, feedback was excellent.

A deer team member participates in the removal of the first axis deer from Hawaii Island.

Draft Strategic Plan: We completed a draft Big Island Deer Working Group Strategic Plan. The plan focuses on ideal control mechanisms, strategies and partner cooperation. The draft is currently under peer review.

Population Assessment: A population assessment was completed for the areas surrounding the recent sighting and high report areas. The area comprises less then 5% of the Big Island, population estimates are between 20-30 axis deer. A combination of aerial surveys and ground transects where used.

Educational Video: A comprehensive 112-minute educational video was created; it focused on axis deer behavior. The purpose was to train individuals on axis deer visual identification and acoustic recognition. The video has been used in training for both partner agencies and the public.

Deer Tracking Workbook: A comprehensive axis deer tracking workbook was created that focused on the primary means of identifying axis deer for both certification and dispatch. The workbook also focused on sign transects and recognizing the difference between axis deer and other ungulates present in Hawaii.

Outreach and Training: We have completed multiple trainings for both partner agencies and the public. The primary goal of the training is to increase the reliability and frequency of deer sighting along with education on adverse effects. The training includes both the use of the video and the workbook.

Other Activities in FY12

Satellite Telemetry Video Collar Test: A United States Fish and Wildlife Service grant allowed the deer team to test a new satellite telemetry video collar that enables you to track deer remotely and "see what the deer sees". The test was extremely successful and the implications of this tool for both eradication and certification are significant.

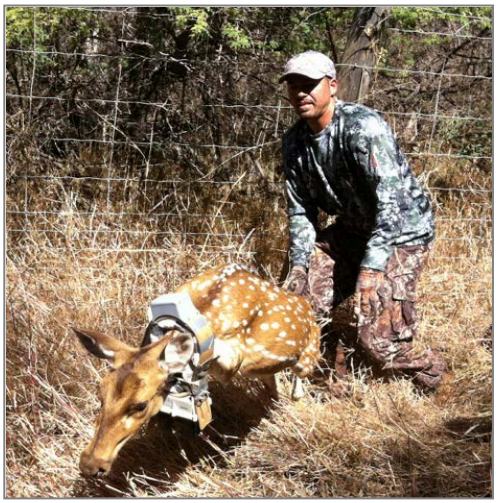
ACETA Aerial Shoot: BIISC assisted and participated in the recent south slope aerial shoot on Molokai. This provided a learning opportunity for our staff and in exchange staff utilized FLIR technology to significantly increase engagement efficacy during the operations.

Judas Deer Proposal: A preliminary proposal to utilize axis deer as Judas animals for the project has been complete. It includes justification, research and results specific to axis deer and cost estimates. An additional test is planned for the near future.

Additional Information

Senate Bill – BIISC was integral in assisting Senator Gil Kahele and staff in the introduction and passing of Senate Bill SB3001 Conference Draft 1. This bill addresses a primary factor in any eradication project, stopping the import of additional target species.

"No person shall intentionally, knowingly, or recklessly possess, transfer, transport, or release after transport through interisland movement any live wild or feral deer unless permitted by the department or other department of the State."



Dexter Pacheco, NPS Staff, participating in the recent Satellite Telemetry Video Collar Test

Partner Collaboration: The deer team conducted multiple successful partner operations. Participants included staff from DOFAW, National Park Service, Three Mountain Alliance, Kaheawa Wind Power and BIISC. With an average of 17 people in the field over multiple days we were able to conduct comprehensive ungulate surveys with a high level of confidence. The end result was an average of 1,100 acres surveyed per day during partner operations.

Title: Control of Little Fire Ants in Hawai'i
Organization: Hawai`i Ant Lab
Award: $72,782.59

Introduction: The Hawai`i Ant Lab (HAL) is located within HDOA in Hilo. Its charter is to protect Hawai`i from new intentional and unintentional introductions of invasive ants, to prevent the inter-island and intra-island spread of existing invasive ant species, and to provide sound, practical treatment methods for homeowners and industry. Currently staffed by Dr Cas Vanderwoude, Michelle Montgomery and Brent Sheehan, the team handles a startling array of projects and activities related to research, extension and training. Total HAL funding for 2011-12 fiscal year was approximately $283,000, with approximately 25% provided by HISC.

Achievements in FY12

HAL staffer Michelle Montgomery showing onlookers Little Fire Ants in the field

Eradication of outlying Little Fire Ants (LFA) infestations:

1. Maui
HAL conducted four post-eradication surveys of the infested site on Maui. The treatment area remains free of LFA. A single incipient LFA colony was discovered about 50 ft beyond the control boundary in February 2012. This has now been treated on two occasions. Treatment and follow-up monitoring will continue through '12-13 fiscal year.

2. Kailua-Kona
All known infested sites in Kailua-Kona were visited three times during the reporting period. So far there are 6 infested sites, four have no LFA and two are under active suppression. Recently, two additional sites have been discovered.

3. **Kauai**
During the reporting period, substantial progress has been made towards eradication of LFA from Kauai. First, access issues have been overcome. Additionally, an experimental use permit covering the use of off-label bait formulations have been applied for and approved. State registration and a section 2(ee) registrant recommendation have been approved for Tango® a key chemical needed for this project. All stakeholders, including residents have met and agreed on a proposed course of treatment and monitoring activities which will commence in September 2012.

Improving LFA management capacity:

1. Requests for assistance
Over 300 public enquiries were recorded during the 2011-12 year (Figure 1). Record-keeping was not complete for this period and the actual number of public enquiries was much higher. Most enquiries were from the districts south of Hilo (48%) and in keeping with trends of past years, a substantially greater number of calls are being received from the Hilo urban area (45%). The remainder of calls were recorded from the Hamakua coast.

2. www.littlefireants.com
Visitation at the dedicated fire ant website continues to increase to a total of 3866 visits during the 2011-12 year. Of these, 60% of visits were from Hawai`i – Big Island 51%, Oahu 41%, Maui 6% and Kauai

2%. The entire website was re-coded as the original format no longer fitted the increasing complexity of the pages. This may have to be repeated during the 2012-13 year as the website grows.

3. Efficacy of control products

Field testing the palatability of baits available for sale in Hawai`i revealed substantial differences (Figure 2). One result of some concern was the discovery that the only two products available for use in food crops were entirely unattractive and therefore have little or no efficacy. Fortunately, HAL was successful in obtaining state registration of a new product (Tango®) that will act as a suitable replacement.

Training for HISC Communication staff:

A two day training session on invasive ants was prepared and delivered to HISC communication staff on 14-15 November in Hilo. Training was well received and provided staff with a greater understanding of the issues involved. The main training presentation is available for download here: https://dl.dropbox.com/u/17898942/ant%20communication%20workshop.pdf

Additional Information

The 2011-2012 year has been a formative year for the Hawai`i Ant Lab. The addition two new staff to the team has greatly increased the Lab's capacity for research, outreach and extension. This is vitally important as LFAs continue to spread at rapid rates, making new inroads into the Hilo urban area and agricultural industries. In previous years, Little Fire Ants were mostly confined to the acreage districts south of Hilo, Now in the urban area where house lots are much smaller, the number of affected residents could increase at much faster rates.

Contact Information

Hawai`i Ant Lab,
Pacific Cooperative Studies Unit, University of Hawai`i
Hawai`i Department of Agriculture
16 E. Lanikaula St Hilo. HI 96720
Ph: 808 315 5656
email: info@littlefireants.com

Want more information?
go to www.littlefireants.com

Depiction of a senior HAL staffer about to treat for Little Fire Ants. © Brooke Mahnken, Maui Invasive Species Committee

Figure 1. Public enquiries for 2011-2012 year listed by type and location.

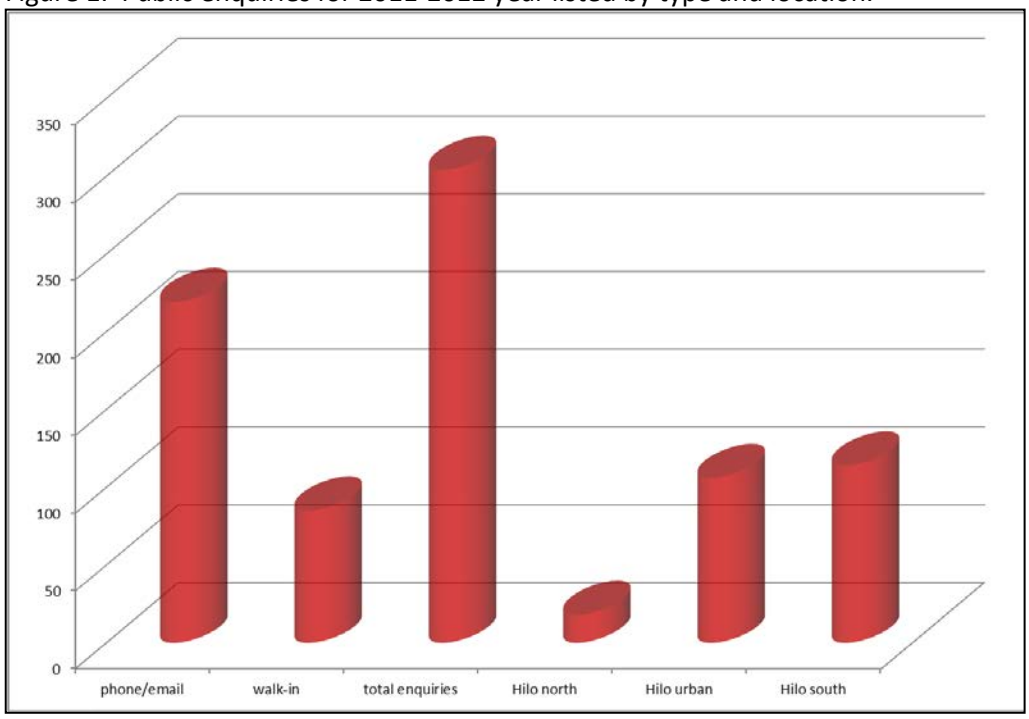
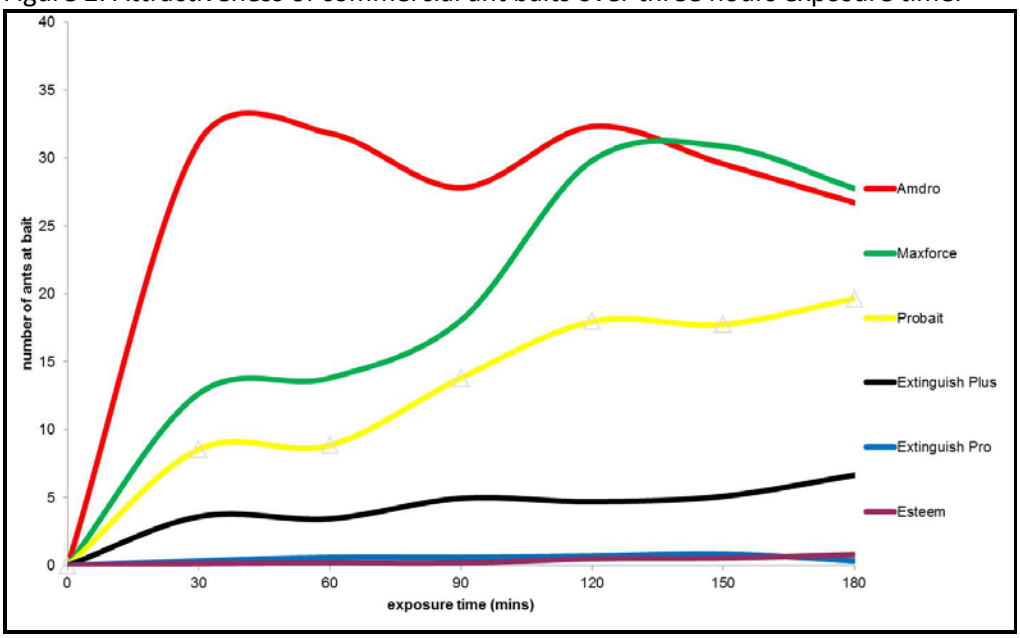


Figure 2. Attractiveness of commercial ant baits over three hours exposure time.



VII. HISC Public Outreach Working Group

Public Outreach Working Group (POWG) Goals

- Educate the public and private sector about invasive species to positively affect perception, action, and funding for control and prevention.
- Foster awareness and concern in the general public about invasive species.
- Increase public and private support.
- Seek measurable changes in behavior.
- Promote priority messages in HISC Strategy.

Students help to remove invasive algae during the ʻAina Hoʻola o Maʻilikukahi Youth Conference on Conservation and Agriculture co-organized by HISC.

Funded Projects for FY12

The lead agency and chair for the Public Outreach Working Group transitioned from DOT to DOH in FY12. During the FY12 budget process, the Public Outreach Working Group funded eight projects, totaling $194,757:

1) *Public Education and Outreach in Kauaʻi County,* Kauaʻi Invasive Species Committee: $35,000.
2) *Oʻahu Invasive Species Public Education and Outreach,* Oʻahu Invasive Species Committee: $35,000
3) *Public Outreach & Education in Maui County*, Maui Invasive Species Committee: $35,000.
4) *Hawaiʻi Island Invasive Species Education and Outreach*, Big Island Invasive Species Committee: $33,490.
5) *Hawaiian Ecosystems at Risk Project Technical Assistant*, Hawaii Ecosystems at Risk Project: $20,000.
6) *Hawaiʻi Landscape and Forestry Pest Identification Cards*, DLNR DOFAW, $6,000.
7) *Aquatic Invasive Species Outreach*, Aquatic Invasive Species Program, DAR, DLNR: $4,500.
8) *Management of Invasive Species Data and Web Products in Hawaiʻi*, Hawaiʻi Biodiversity Information Network, $29,407

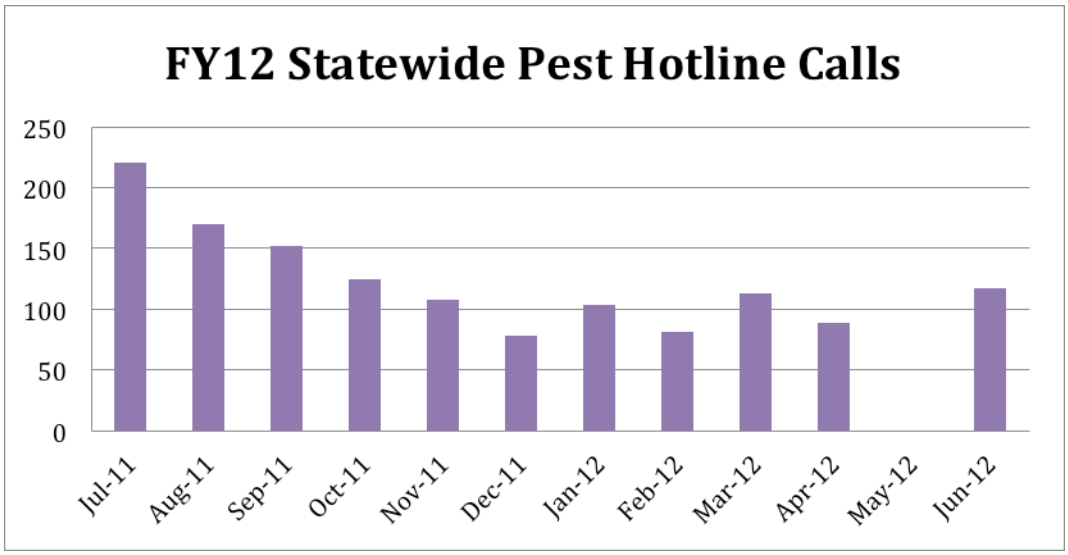
Key Activities in FY12

- High quality newsletters produced
- Little Fire Ant Public Service Announcements
- Outreach at county fairs
- Volunteer algae cleanup
- Aquatic invasive species outreach to schools

Measures of Effectiveness for the Public Outreach Working Group

Pest Hotline

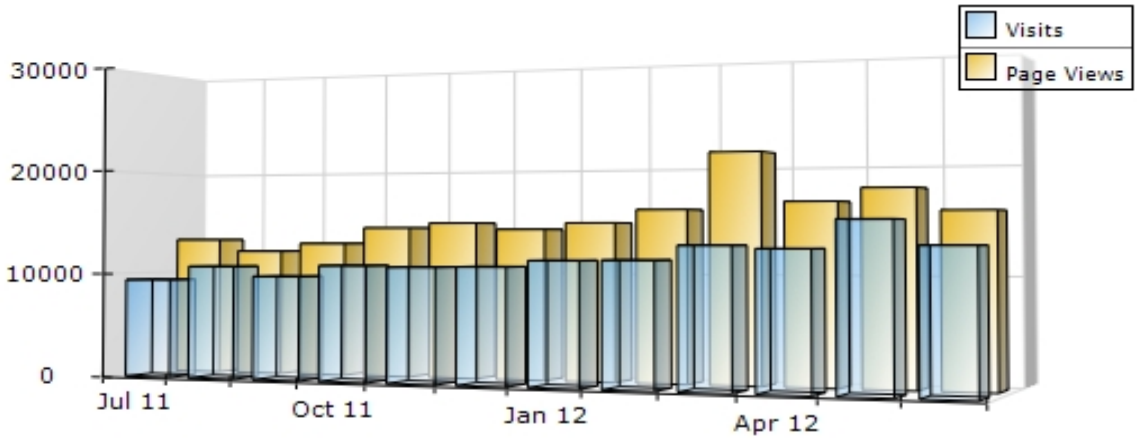
The original set-up charges for the Pest Hotline (643-PEST, a statewide direct-dial number that is routed to the local office of the Department of Agriculture) were funded by the HISC, and the HISC POWG continues to promote this number as a reporting tool for the public. In FY12, the Pest Hotline received 1353, compared to 1,358 calls in FY11. It is imperative that HDOA has adequate staffing to respond to pest hotline calls from the public.



HISC Website

"Number of Hits to the Invasive Species Web Pages" is another measure of effectiveness for the POWG. The site, www.hawaiiinvasivespecies.org, hosts the pages for the HISC, Coordinating Group on Alien Pest Species (CGAPS), the Invasive Species Committees (ISCs), and general invasive species information.

In FY12, the logged number of website "hits" totaled 622,955, down from 750,696 in FY11. Many of these hits were from Hawai'i (260,109) with additional hits coming from California (67,756), Washington (25,005), Texas (17,616) and other locations. Of the hits from Hawai'i, 116,450 came from Honolulu. Additional hits came from Kāne'ohe (21,037), Mililani (12,556), Kailua (9,363), 'Ewa Beach (8,241), Waipahu (6,839), Hāna (5,930), Kona (7,214), Hilo (6,053) and others.



Title: Outreach for Kauai County
Organization: Kauai Invasive Species Committee (KISC)
Award: $31,360

In FY 2012, KISC Outreach continued working on goals outlined by the HISC Public Outreach Working Group Strategic Plan. Priority was given to educating the community and country workers regarding the importance of Early Detection and providing them with ways to report new species sightings. KISC also participated in various education programs and community events across Kauai, highlighting not only statewide invasive species concerns, but KISC local priority targets as well. KISC works on raising awareness, building participation and partnerships, and connecting with community on a grassroots level. Outreach included personal interactions with the public as well as many media mentions.

Achievements in FY12

Number of people reached through talks and displays:
KISC presentations and displays targeted Priority Audiences of the HISC strategic plan: the General Public and Students. All presentations and displays were developed to raise awareness of invasive species issues on the island, educating the public about target species as well as Early Detection species.

Interactive display at events

- KISC presented to public schools, neighborhood association, conservation groups, and the Department of Transportation. Students and Public reached: 270
- KISC provided library displays to inform the students at Kauai Community College about target species in their community. Estimated students reached: 500
- KISC developed an interactive display entitled "STOP Invasive Species". Estimated signatures: 500
- Guest on Mayor's show "Together We Can." Estimated public reached: 2,000 http://kauai.granicus.com/MediaPlayer.php?view_id=2&clip_id=654

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


Agriculture Awareness Day Booth

KISC participated in various educational programs and community events around the island targeting multiple Priority Audiences of the HISC strategic plan: Special Interest Groups, Students, and the General Public. Special Interest Groups included plant sellers and growers, environmental professionals, and county and state workers. Programs focused on gaining public support on invasive species issues as well as education on identification of KISC target species.

- As part of the Hawaii Early Detection Network, KISC continued to promote and hold workshops on Kauai. Estimated reached: 136
- KISC participated in the Kauai Farm Bureau Agriculture Awareness day with both lectures and a display booth. Presentations to the elementary students focused on introducing the impacts of invasive species to the students and raising their awareness. Estimated Students and Teachers reached: 500

- KISC displays were present at community events across the island including: Kauai Farm Fair, Garden Fair, Arbor Day, Banana Poka Roundup, Kauai Conservation Awareness Day, After hours Chamber of Commerce, and Kauai Community College Earth Day. Estimated Public reached: 3,900

Number of education materials produced:
Educational materials, take-away items and "prizes" are some of the best forms of public outreach. KISC continued to promote the messages in the Strategic Plan.

- KISC produced posters promoting the messages: "Plant Native Species", "Don't Buy a Pest", "Protect Hawaii", and "Don't Plant a Pest". Estimated public reached: 2,000
- Priority species informative postcards were given at events and to targeted landowners. Estimated public reached: 1,000 http://www.hawaiiinvasivespecies.org/iscs/kisc/targetspecies/
- KISC also handed out multiple "prizes" promoting the Pest Hotline and invasive species awareness. Estimated public reached: 2,000
- KISC produced a supplement to the Kauai Early Detection Field Guide based on plants found on the Roadside survey. Estimated public reached: 140

KISC Early Detection Species Poster

Other Activities in FY12

Codes of Conduct adopted by the Kauai Landscaping Industry Council (KLIC) updated: In 2006, KISC formed a relationship with KLIC and passed the first Voluntary Codes of Conduct by KLIC. In 2012, KISC updated the Codes of Conduct with KLIC having them agree to avoid selling and promoting any plant deemed high risk and to restrict sales of plants on the Landscape Industry Council of Hawaii invasive list.

Continued development of Kauai's Early Detection program through workshops with County workers and conservation groups: KISC continued to promote KISC's Early Detection program. Early Detection workshops were held for County of Kauai workers from various departments including Department of Water, Department of Waste, Public Works, and Parks and Recreation.

Newsletters: KISC produced and e-published its annual newsletter "Kiai moku", this year's focused on successes throughout the year including the eradication of the Lāwa'i infestation of coqui frog and the first live mongoose caught on Kauai (http://www.hear.org/kisc/newsletter/pdfs/kiaimoku2012v5n1.pdf). KISC also produced bi-weekly newsletters regarding coqui frog work (http://www.hear.org/kisc/coqui_news/), as well as the Quarterly Newsletter http://www.hawaiiinvasivespecies.org/iscs/kisc/pdfs/kisc2012fyq3report.pdf.

Contact Information

For more information, please contact: Keren Gundersen, KISC Project Manager, kgunder@hawaii.edu 808-821-1490, www.kauaiisc.org

Title: O'ahu Island Invasive Species Public Education and Outreach
Organization: O'ahu Invasive Species Committee
Award: $35,000

Introduction: The O'ahu Invasive Species Committee (OISC) was founded by a group of volunteers concerned about the spread of miconia and fountain grass on O'ahu. These pests had already wreaked havoc on other islands' ecosystems, but were only just beginning to do damage on O'ahu. OISC realized early on that outreach is essential to all field operations. Since OISC's mission depends on getting voluntary permission from private property owners for OISC field crews to survey their lands, outreach is key. Also, the public can report OISC target species and assist OISC's mission by making the right choices when choosing plants. HISC funds supported 32% of OISC's overall budget and 75% of the budget for the outreach program.

Achievements in FY12

Built support for invasive species work in the communities where OISC field crews operate through work with landowners and neighborhood community groups:
In the first six months of 2012, the outreach specialist built support and secured property access from 45 landowners, constituting 96% success out of all landowners contacted. Contacts with landowners yielded conversations about OISC target species and invasive species in general.

The Mānoa Neighborhood Board has asked OISC to present information about invasive species at their monthly board meetings. This has been a great opportunity to speak about current HISC initiatives as well as OISC activities. Presentations have been given on using the Hawai'i Pacific Weed Risk Assessment, the importance of buying local cut flowers to protect against myrtle rust, OISC's miconia control program in Mānoa Valley and little fire ant. Neighborhood board meetings are re-broadcast on 'Ōlelo community television.

OISC has been in constant communication with the Wai'anae Neighborhood Board regarding a joint spray operation between OISC and the O'ahu Army Natural Resources Program for fountain grass in Wai'anae. The board has been supportive of the operation and understands that this is a priority species because fountain grass infestations can cause more frequent and more destructive brush fires. At the neighborhood board meeting where this information was presented, Cynthia Rezentes, a prominent Wai'anae community member, stood up and publicly thanked OISC for the work we do and for protecting Wai'anae from this pest.

OISC also presented invasive species information to the Honolulu Sunset Rotary Club and to GIS professionals at the Hawai'i Pacific GIS conference. Both these events were particularly valuable because they reached audiences outside the traditional conservation sphere.

Worked with the HISC Communications Coordinator and the Public Outreach Working Group to implement statewide priority public outreach campaigns:
The OISC outreach specialist worked with CGAPS and the Public Outreach Working Group to present invasive species information at a legislative briefing in January of 2012. Although only four legislators attended, the event was well covered in the media and segments were broadcast by KITV and HPR. The outreach specialist has attended all POWG meetings.

Incorporated information about biocontrol into OISC outreach activities:
As part of the basic information it presents to schools and community groups, OISC discusses the importance of using natural enemies to restore balance to areas infested with established invasive pests.

Worked with HDOA, the landscape industry and other ISC outreach specialists to create and disseminate best management practices to prevent high-priority pests from establishing on O'ahu:
The outreach specialist co-wrote an article with HDOA staff for the landscape industry magazine, *Landscape Hawai'i*, about the status of coqui frogs on O'ahu and outlining the best management practices for landscapers and nursery owners to follow.

Students at the OISC outreach booth

Presented invasive species information to schools and cooperated with educators on invasive species projects:
The outreach specialist gave a total of 11 presentations to students ranging from intermediate to university level. OISC field crew participated in career days at Nanakuli and Wai'anae High Schools. The OISC outreach specialist was invited to participate in Mililani High School's annual Science, Technology, Engineering and Mathematics event to expose students to science applications in everyday life. OISC participated in the first annual Hawaii Environmental Education Symposium and shared OISC outreach materials with educators.

In addition, the OISC outreach specialist wrote articles about coqui frogs for *Landscape Hawai'i* and *Green* magazine, a free publication that focuses on sustainability issues. Although sustainability advocates may not seem like a new audience, the sustainability conversation has not involved invasive species very much and has sometimes clashed over such issues as feral ungulates and the use of pesticides to control invasive plants. Therefore, working within this community is still important.

The OISC outreach specialist also partnered with DOFAW to accompany media representatives to Mt. Ka'ala to show them the importance of native forests to water production and provided quotes in an article that was printed on the importance of native forests. Articles about OISC's work were also printed in the Conservation Council for Hawaii's newsletter and in *Honolulu* magazine. For The Great Race Eco-Challenge Hawaii event website, the outreach specialist wrote several short articles focused on the threats of invasive species to different types of native plant communities through which race participants will trek during the races.

The activities listed above resulted in conversations about invasive species with 1,528 people including educators, students and their parents, and community leaders. Based on circulation and viewership data for KITV, HPR and the print media outlets mentioned above, OISC's media work resulted in outreach to another 384,712 people.

For more information, please contact:
Lara Reynolds, Outreach Specialist, O'ahu Invasive Species Committee
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lreynolds@hawaii.edu
www.oahuisc.org

Title: Public Outreach & Education in Maui County
Organization: Maui Invasive Species Committee
Molokaʻi Invasive Species Committee

Award: $35,000

Introduction: The Maui Invasive Species Committee (MISC) and Molokaʻi Invasive Species Committee (MoMISC) have a combined experience of nearly twenty-five years building invasive species awareness across Maui County. Outreach and education are integrated components of the MISC and MoMISC projects. Staff involved in outreach activities have exceptional longevity with the projects, frequently serving as resources for other conservation and education programs within Hawaiʻi. Outreach messaging has a strong basis in field experience which ensures that outreach messages and delivery are grounded in the real world. MISC and MoMISC are projects of the Pacific Cooperative Studies Unit, University of Hawaiʻi.

Funds from the Hawaiʻi Invasive Species Council provided partial support with county and federal funding sources helping to round out a comprehensive strategy to strengthen public awareness and support for work on invasive species.

Achievements in FY12

The primary goal for outreach and education activities under this project was to positively affect perception, action, and funding for invasive species. The MISC and MoMISC strategic approach for engaging the public includes a comprehensive media program, participation in community events, involvement with the landscape industry, and a strong education program. The outreach programs effectively targeted all priority target audiences:

Invasive species "jenga" with the keiki

- Decision makers: Personal visits to Maui County legislators and County Council members helped ensure they have relevant information about invasive species issues.
- Special interest groups: MISC and MoMISC have developed positive working relationships with members of the landscape industry through the Maui Association of Landscape Professionals and by having a regular presence at community events. MISC is strengthening its connection to the farming and ranching communities by participating in the Maui Deer Working Group.
- Students: The Hōʻike curriculum has provided a natural pathway for "teaching the teachers" about invasive species issues and for direct interactions with Maui's students.
- General public: In addition to MISC and MoMISC's extensive presence via events, newspaper articles, and presentations, some of the most effective communication occurs during field work in the community. Much of the work takes place on private property and often includes an

educational component.

The impacts of these activities are evident in sustained county support, access to private property, and a high degree of public awareness about invasive species issues.

HISC supported the following achievements with FY2012 funding:

- **Track number of print and broadcast media mentions:**
  - Print media: Published 12 monthly articles on invasive species topics in the *Maui News* (circulation of 22,000); 13 other media mentions in the *Maui News*, *Molokai Dispatch*, and other publications in Maui County. MISC's newsletter featuring little fire ant was distributed via mail and email to an estimated 600 people.
  - Broadcast Media**:** Little fire ant PSAs ran four different times on public cable stations and regularly on the local public access station. MISC work was featured in two videos (OC 16 and KGMB). A local video project created two short PSAs about miconia. Work continued on a little fire ant video with additional footage obtained from the Big Island. Staff assisted with filming a video on axis deer.
- **Number of "hits" on invasive species web pages:** MISC and MoMISC maintained six different Internet sites; estimated reach: 10,000 pageviews.
- **Number of people reached through talks and displays:**
  - Displays: booths at 15 community events; estimated reach: 4,393 people.
  - Presentations: Gave eight presentations to community groups / professional conferences; estimated reach: 250
- **Number of educational programs:** A total of 28 activities, focused on school groups across the islands, reached 1,273 students.
- **Number of volunteers recruited:** Staff led three volunteer trips; total reach: 107 students and teachers.
- **Early detection workshops:** Natural resource workers with the Maui Forest Bird Recovery Project learned about different target species during an Early Detection workshop training.
- **Number of teachers trained:** Conducted three curriculum workshops for teachers using the Maui-based Hōʻike o Haleakalā science curriculum; 14 participants.
- **Interns hosted:** MISC hosted four AmeriCorps summer interns and four Student Conservation Association interns. Staff collaborated with Haleakalā National Park's summer high school internship program.
- **Develop support from landscape Industry:** MISC presented the 9th annual Mālama i ka ʻĀina award to two landscape professionals for their proactive efforts to stop the spread of invasive species; staff attended meetings of the Maui Association of Landscape Professionals.

Award to local landscapers featuring native damselfy

Contact Information

For more information, please contact:
Teya Penniman, MISC Manager, misc@hawaii.edu 808-573-6472, www.mauiisc.org
Lori Buchanan, MoMISC Field & Outreach Coordinator, lbuchanan@tnc.org 808-984-6585

Outreach on Moloka'i

Title: Outreach and Education on the Island of Hawai'i
Organization: Big Island Invasive Species Committee
Award: $33,490

The Big Island Invasive Species Committee (BIISC) is a federal-state-private partnership. BIISC's mission is to prevent new pest invasions on the island of Hawaii, stop newly established pests from spreading, provide local control of established pest species, and develop public support. BIISC has been operating since 1996.

HISC support leveraged funding from the United States Forest Service and the United States Fish and Wildlife Service totaling an additional $37,683. Highlighted outreach topics for FY2012 included prevention of hitchhiking pests (particularly urban forest pests) for the green industry and the spread of invasive fire-prone grasses.

Achievements in FY12

Number of events, audience reached

In Fiscal Year 2012, BIISC attended 67 outreach events which had a total attendance of 29,000 people; an estimated 11,000 people directly viewed BIISC's displays. The BIISC Manager gave a presentation to the County Council that was televised statewide. Geographically, 31 events were in South Hilo district; 4 in North Hilo, 2 in Kau, 8 in North Kona, 1 in North Kohala, 6 in South Kohala, 4 in South Kona, and 6 in Puna. Information about BIISC's activities was also disseminated during several professional conferences that were international, national, or statewide in scope. Staff gave oral presentations or staffed posters and informational booths, including posters on albizia at the Hawaii Conservation and the Society of American Foresters conference. These activities reached a diverse set of audiences, including the green industry, cultural groups, and school groups, and covered a variety of topics, including little fire ant focus, marine issues, and invasive pests of honey bees.

BIISC booth at Ka'u Coffee Fest

Educational materials focusing on species targets and public policy

BIISC published articles in green industry and local newsletters. BIISC produced an outreach newsletter which can be found at: www.hawaiiinvasivespecies.org/iscs/biisc/pdfs/biiscnewsletter201203.pdf Six vinyl banners were produced with topics ranging from rapid response, grasses of Hawaii, axis deer, mangrove, wetlands, and aquatic invasions. BIISC worked with the statewide online pest reporting system (www.reportapest.org) to develop species identification cards in collaboration with the National Park Service. An early detection brochure was developed to highlight the need for early detection and the gaps in public policy.

Short videos (1-2 minutes) about BIISC projects

BIISC began work on a number of video projects, including a short video about BIISC and the Early Detection program . An intermittent hire videographer has interviewed BIISC staff, reviewed all raw

footage collected over the past two years and completed an initial "What is BIISC" video (.http://vimeo.com/48095363). Additional footage was collected during a meeting focused on outreach challenges on the Big Island and New Zealand.

Number of hotline calls and reports
The BIISC hotline averages one call per week. All messages are responded to with a call, information, field response, or referral as appropriate. Early detection workshops and outreach materials encourage use of www.reportapest.org. BIISC receives occasional reports from that system.

Other Activities in FY12
Horticultural Industry: BIISC worked to develop a positive relationship with the horticultural industry by attending meetings of the Hilo, Hamakua, and Big Island Farm Bureau, the Big Island Nurserymen's Association, the Hawaii Export Nursery Association, and the Hawaii Floriculture and Nursery Association.

Education: BIISC worked with local schools to provide classroom lectures when requested. Staff provided hands-on learning experiences for students by working with Hilo High School students and an island-wide home-schooling program to manually remove mangroves at two sites. Staff gave two presentations to high school agriculture classes and led students in a debate on the pros and cons of axis deer introduction. Outreach staff gave a talk on invasive insects to a 3rd grade class and also a college level-lecture.

Internships: BIISC hosted two PIPES (Pacific Internship Programs for Exploring Science) interns who worked with the Lokowaka Coot Project and The BIISC GIS Specialist.

Other: BIISC developed a display on climate change and invasive species impacts on the Big Island. Outreach staff participated in webinars on communicating climate change issues. BIISC participated in two trainings for Hawaii Department of Transportation roadside workers to help inform them about invasive species issues and pests and is following up by continuing to provide relevant outreach materials to HDOT. BIISC Manager staff met with County Council and state legislators to explain invasive issues.

Additional Information

For more information, contact: Page Else, Outreach Specialist, pageelse@hawaii.edu, 808-933-3345.

Title: Aquatic Invasive Species Outreach
Organization: Division of Aquatic Resources
Award: $4,000

Introduction: The Division of Aquatic Resources (DAR) Aquatic Invasive Species (AIS) program focused on the control and prevention of aquatic invaders throughout the Hawaiian Islands. Outreach is an essential aspect of controlling and preventing aquatic invasive species. The AIS program currently has a project underway to control invasive algae in Kaneohe Bay, Oahu though mechanical removal via the Super Sucker barge and by replenishment of native herbivores (collector sea urchins, *Tripneustes gratilla*) onto affected reefs. Outreach efforts have focused on topics related to this project in an effort to gain public support and community involvement. With support from HISC, the AIS program has increased outreach through education programs and public events to inform and involve local communities on invasive species issues. $4,000 of the requested $11,500 was granted for FY12.

Achievements in FY12

Interactions with general public: In total, ten outreach events were conducted to help raise awareness on the harmful effects of alien invasive seaweed. They were as followed:

- Invasive Species Awareness Week: The AIS team set up a booth at the He'eia Kea Small Boat Harbor that displayed the various types of invasive algae and a small tank with native collector sea urchins, which are used as biocontrol agents against the invasive algae. He'eia Kea is the main boat harbor in Kaneohe Bay with the most boat traffic from recreational and commercial fisherman, tourists, and divers, and serves as an important point to prevent the spread of invasive algae. Information bulletins and brochures about invasive algae were provided to the public. Additionally, the AIS team gave a presentation at Hanauma Bay education center to educate participants on aquatic invasive species and their threats to our waters.

- 1st Kokua Kaneohe Bay Invasive Species Community Clean Up: In March 2012, the AIS team hosted an invasive algae community clean up event, where over sixty volunteers participated in the event, including Hui Wa'a Kaukahi Kayak Club. The volunteers removed invasive algae from a fringing reef outside Paepae o He'eia fish pond. Over 16,000 pounds of invasive algae was removed. Notification of the event was posted on Green Magazine's webpage and an article about the event was printed in the magazine.

Volunteers removed invasive seaweed from the fringing reef outside He'eia Fish Pond.

- Benjamin Parker Elementary School: The AIS team participated in an in-class, hands-on presentation on invasive algae and the native sea urchins. The students were able to touch the algae and urchins and learn the connectivity between the two. Additionally, the team returned for Science Night, which enabled more students and their parents to learn of the invasive algae project in Kaneohe Bay. Information bulletins and brochures about invasive algae were provided.

- Expos and Conventions: The AIS team participated in both the Hawaii Ocean Expo and the Hawaii Conservation Conference. At both events, an exhibitor booth was set up to display the efforts in Kaneohe Bay as well as having invasive algae and urchin displays for the participants to see and touch. Information bulletins and brochures about invasive algae were provided.

Field/outreach technician, Tristan Walker, at the 2012 Ocean Expo where she presented information on alien invasive seaweed and the use of native

- Field Demonstrations: Students from the University of Hawaii, Native Hawaiian Science & Engineering Mentorship Program participated in in-field demonstrations of the Kaneohe Bay Super Sucker project. This opportunity allowed the students to enter the water and have a firsthand experience removing the invasive algae. In addition, students from the Mililani 'Ike robotics class created a "Submarine Bot" that was designed to remove invasive algae. This class and their parents came out to the field for a hands-on demonstration of the Super Sucker and helped transplant native sea urchins to the affected reef.

- Television Opportunity: Aqua Kids children's television show attended a field operation day and filmed an episode of the Super Sucker and what is being done to protect the coral reefs. Aqua Kids is a children's television program, which seeks to educate young people about the importance of protecting marine environments and the animals that live there. This show is projected to reach thousands of children and their parents every year.

Due to limited resources, no other outreach deliverables were met.

Contact Information

Tristan Walker, Field/Outreach Technician	trwalker@hawaii.edu	719-229-9006
Jono Blodgett, AIS Program Leader	jb88@hawaii.edu	808-256-3095

Title: Management of Invasive Species Data and Web Products in Hawaii
Organization: Hawaii Biodiversity Information Network
Award: $29,407

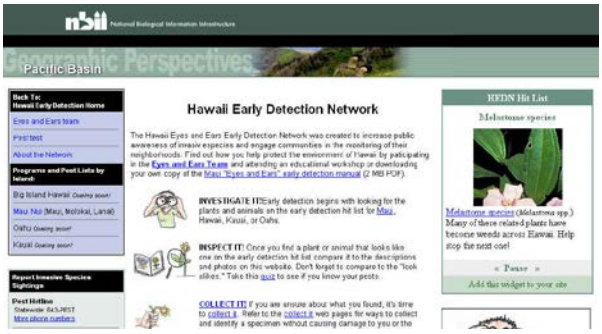
Introduction: The Hawaii Biodiversity Information Network (HBIN) provides for the continued maintenance, update, and expansion of a core invasive species data and information infrastructure in Hawaii. Associated web products, databases, and data management services are important to certain programs and activities in the State.

At an ideal full capacity, the HBIN yearly budget need would be $220,000. In FY 12 HBIN requested $89,551 to fund approximately 6 months (July to December) of activities. HBIN received $29,407 (32% of FY 12 request; 18% of full capacity budgetary needs). The HISC FY 12 award was supplemented with $50,000 in DOFAW general funds bringing the combined award to $79,407 (89% of FY 12 HISC request; 36% of full capacity budgetary needs).

HISC FY 12 funds have supported the creation and transition of the HBIN project at UH Manoa Pacific Cooperative Studies Unit (PCSU) from what was a federally funded program under the United States Geological Survey (USGS) called PBIN. The PBIN program officially ended on 7/31/2012. From 5/16/2012 (the official first day of the HBIN project) until 7/31/2012 there was a transition period where some HBIN staff were working for both programs. This report details HBIN achievements from 5/16/2012 to 8/15/2012.

Achievements in FY12

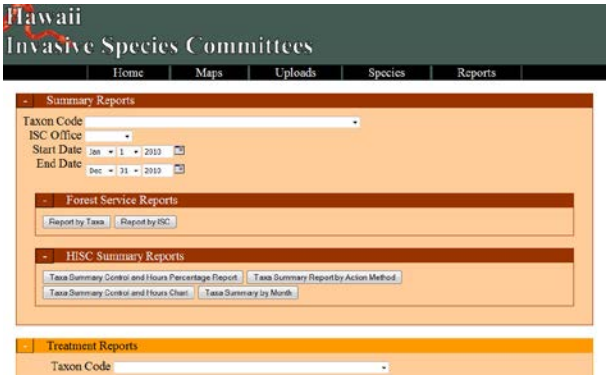
The Establishment of the HBIN Program:
The HBIN project officially started on 5/16/2012 when the Project Manger was hired at 50% FTE. From 5/16/2012 to 6/30/2012 the Project Manager worked to establish the HBIN team and create the administrative foundation for the project. Three other HBIN staff positions started within the first week of July. Specific activities from 5/16 to 6/30:



Reportapest.org and the Hawaii Early Detection Network site managed by HBIN

- Created and established three RCUH HBIN positions by writing position descriptions and managing approval process with the help of PCSU staff
- Managed the interview and hiring process with the help of PCSU staff
- Initiated the requisition of necessary technical equipment for the project
- Secured the maintenance and functioning of the HBIN server at UHMC
- Established necessary budget projections and budget management protocols
- Established task and deliverable management framework

The Plant Pono Webite: Provide active hosting, management and curation (content updates and required changes) of the site based on HISC Public Outreach Working Group needs.



The Plant Pono website is hosted and managed within the HBIN infrastructure. A new version of this site has been in development and will be publically available soon. HBIN staff actively manages the back-end database. Activities related to this deliverable:

- Migrate site to a more stable server framework
- Maintain contractor access to website and back-end database
- Create the Plant Pono database standard and update procedure in collaboration with WRA Specialists

Weed Risk Assessment Database: Convert existing WRA database data entry application to a web application.

The Weed Risk Assessment Database is hosted and managed within the HBIN infrastructure. The existing Microsoft Access / SQL Server model is not ideal for long-term stability; therefore, the front-end software will be converted into a web application. Activities related to the Weed Risk Assessment Database:

- Create a development environment and mirrored version of the WRA database
- Re-create table primary keys and key indexes
- Re-create database relationships
- Conduct first phase of Technical Requirements Analysis based on WRA Specialist needs

Hawaii Early Detection Network: Continued support and expansion of the reportapest.org online pest reporting system.

The reportapest.org online pest reporting system is hosted and managed within the HBIN infrastructure. During the past six weeks 6 public reports have been received from the public. Each report has been processed and curated by HBIN staff. This includes:

- Interaction with the public reporter
- Attempts to identify the reported pest
- Referral to appropriate agency

For more information, please contact: Sky Harrison (HBIN Project Manager) at skyh@hawaii.edu

Appendix 1: Chapter 194, Hawaii Revised Statutes: 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; provided that the appropriate state agencies shall collaborate with the counties and communities to develop and implement a systematic approach to reduce and control coqui frog infestations on public lands that are near or adjacent to communities, and shall provide annual reports on the progress made in achieving this objective;

(5) Coordinate and promote the State's position with respect to federal issues, including:

(A) Quarantine preemption;

(B) International trade agreements that ignore the problem of invasive species in Hawaii;

(C) First class mail inspection prohibition;

(D) Whether quarantine of domestic pests arriving from the mainland should be provided by the federal government;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) The council shall be placed within the department of land and natural resources for administrative purposes only and shall be composed of:

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

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

(A) Business, economic development, and tourism;

(B) Health; and

(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; am L 2008, c 160, §1]

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

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

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

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

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

(C) Transportation; and

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

(A) Agriculture; and

(B) Land and Natural Resources.

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

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

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

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

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

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

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

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

§16; am L 2006, c 109, §2]

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

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

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

(d) If the owner thus notified fails to comply with the order of the department, or its agent, within the time specified by the department, or if entry is refused after notice is given pursuant to subsection (a) and, if applicable subsection (b), the department or its agent may apply to the district court of the circuit in which the property is situated for a warrant, directed to any police officer of the circuit, commanding the police officer to take sufficient aid and to assist the department member or its agent in gaining entry onto the premises, and executing measures to control or eradicate the invasive species.

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

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

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

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

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

Appendix 2: Resolution 12-1

Hawai‘i Invasive Species Council

HAWAI‘I INVASIVE SPECIES COUNCIL

RESOLUTION

Resolution No. 12-1

SUPPORTING THE MICRONESIAN BIOSECURITY PLAN REVIEW AND IMPLEMENTATION, AND REQUESTING THE INCLUSION OF HAWAI‘I AS A POTENTIAL RECIPIENT OF INVASIVE SPECIES.

WHEREAS, the U.S. Department of Defense has provided funding for an unprecedented regional planning model assessing the risk of invasive species introductions in Micronesia and providing biosecurity recommendations with regard to the relocation of military facilities from various points in the Pacific to Guam and the Commonwealth of the Northern Mariana Islands; and

WHEREAS, the resulting Micronesian Biosecurity Plan will be reviewed by the University of Guam and selected experts throughout the Pacific, with the intent of finalizing the plan and developing a Strategic Implementation Plan; and

WHEREAS, the military relocation to Guam and the Commonwealth of the Northern Mariana Islands will increase transportation between Micronesia and Hawai‘i, thereby increasing the risk of invasive species introductions to the State of Hawai‘i; and

WHEREAS, the Hawai‘i Invasive Species Council is required by Chapter 194-2(a), Hawaii Revised Statutes, to “advise, consult, and coordinate invasive species-related efforts” with state, federal, and international programs and policies; now, therefore,

BE IT RESOLVED by the Hawai‘i Invasive Species Council that the Council applauds the efforts of the U.S. Department of Defense in funding an unprecedented, large-scale, proactive risk assessment regarding invasive species introductions; and

BE IT FURTHER RESOLVED that the Council supports the review of the Micronesian Biosecurity Plan and the development of a Strategic Implementation Plan by the University of Guam and its partners, including experts from Hawai‘i; and

BE IT FURTHER RESOLVED that the Council requests that the risks of invasive species introductions to the State of Hawai‘i be included in the finalized Micronesian Biosecurity Plan and Strategic Implementation Plan, with recommendations for reducing those risks.