Strategic Plan 2015 – 2020

Drawing submitted to HISC for Hawaii Invasive Species Awareness Week 2015 from Kapaa High School, Kauai, representing the theme "Invasive Species are Everyone's Kuleana"

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ISLAND INVASIVE SPECIES COMMITTEES

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- Kauai Invasive Species Committee
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I. Vision and Mission Statements

Hawaii Invasive Species Council Vision Statement

Hawaii's unique economy, natural environment and the health and lifestyle of Hawaii's people and visitors are protected from the impacts of invasive species

Hawaii Invasive Species Council Mission Statement

The Hawaii Invasive Species Council will provide strategic policy and fiscal direction, coordination, and planning among state departments and other stakeholders to address invasive species issues in a science-based, culturally and socially conscious way

II. Introduction

i. Invasive Species in Hawaii

Hawaii's State Legislature recognizes invasive species as the single greatest threat to our economy, natural environment, and the health and lifestyle of Hawaii's people and visitors. Invasive species have devastating impacts on agriculture and local food self-sufficiency, replace native ecosystems and diminish fresh water quality and quantity, and increase disease and other human health concerns.

Hawaii's unique environment and native species have evolved together in isolation over the last 70 million years. Native species are those that arrived in the islands by natural means through moana (waves and ocean currents), makani (wind) and manu (birds and species that they carried). Due to its isolation, natural introductions were limited in number and slow to arrive. Over millions of years a wide variety of habitats developed as an estimated 20,000 species arrived or evolved here. Hawaii is a global hotspot for endemism with an estimated 10,000 of its native species being found now where else.

Hawaii's endemic ohia lehua, Metrosideros polymorpha. State officials and partners are currently working on rules to restrict the import of ornamental plants in the same family (Myrtaceae) as they are vectors of rust diseases which if established could decimate this endemic native plant critical to Hawaiian ecosystems. Photo Credit: HISC

Additionally, no native terrestrial reptiles, amphibians, or social *Hymenoptera* (i.e. ants and wasps) are found here and with the exception of one bat species there are no native terrestrial mammals. The birds, plants, and invertebrates that colonized and evolved in Hawaii enjoyed minimal threats in lush and diverse ecosystems. This has resulted in a large diversity of plants and animals with few natural defenses that are especially vulnerable to disease and competition from other non-native species.

Of the 56 known endemic Hawaiian Honeycreepers, only 18 survive today, of which six are listed as critically endangered by the International Union for Conservation of Nature. Image Credit: H. Douglas Pratt, The Hawaiian Honeycreepers: Drepanidinae

Unfortunately Hawaii is also the extinction and endangered species capital of the world. Hawaii's Division of Forestry and Wildlife estimates that over 100 species of native plants, 90 % of 750 species of terrestrial snails and 71 of at least 113 bird species have been lost forever. While Hawaii's islands only account for 0.2% of the landmass of the United States, they are home to 38% of its threatened and endangered plants and 41% of its endangered birds. For the majority of these extinct and endangered species, invasive species are a primary contributor to their declines (TNCH and NRDC 1992).

In stark contrast to the extremely slow pace at which Hawaii's native species arrived via natural pathways, the arrival of non-native species facilitated by human transportation activities has increased exponentially since the first people arrived over 1,000 years ago. According to the Coordinating Group on Alien Pest Species, over 300 new marine species, 40 terrestrial reptiles, 6 amphibians, and over 8,000 plant species have been introduced to date. Additionally, a risk assessment for the expansion of the Kahului Airport on Maui found that an average of one new pest is detected a ports everyday and over 20 insects are introduced annually.

The Coconut Rhinoceros Beetle (CRB) is one of Hawaii's newest insect pests. Discovered on Oahu in December 2013, the State in partnership with the Federal Government has launched an aggressive campaign to eradicate this invasive species before it spreads on Oahu and to the neighbor islands. CRB have the potential to alter the landscape by destroying Hawaii's iconic palm trees as well as the State's native and endemic palm species.

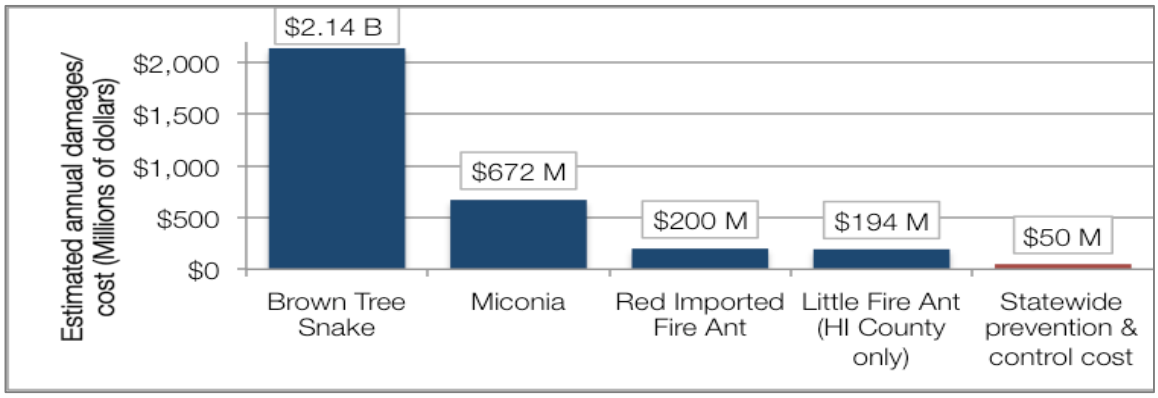
Not all of these introduced species become a problem. However, those that do can be devastating. Feral ungulates (pigs, deer, sheep and goats) destroy native plant ecosystems, while other introduced mammals such as rats, mongoose, and cats prey on native birds and their eggs and hatchlings. Mosquito borne diseases have ravaged native bird populations as both mosquito vectors and the non-native birds carrying new diseases have been introduced by human activity. Introduced plants such as albizia, miconia and strawberry guava have turned once productive and vibrant native ecosystems into extensive monocultures in which native species cannot compete and fresh water recharge is greatly diminished. Introduced plants are also a primary vector for other pests including plant pathogens, insects, and small amphibians. For example, it is thought that the little fire ant, which is now spreading throughout the islands, was initially introduced via plants shipped from Florida in the early 1990s.

Strawberry Guava proliferates atop a ridgeline in Maui. Photo Credit: Forest and Kim Starr

The impacts of invasive species are not limited to natural resources. According to a Nature Conservancy study published in 1996, the agricultural sector in Hawaii looses an estimated $300 million per year in revenue just from the inability to export to potential markets due to alien fruit fly infestations (Holt 1996). Many of Hawaii's other primary agricultural products both for local food production and export are also impacted by diseases such as papaya ringspot virus, banana bunchy top, and alien insects such as coffee berry borer and little fire ants.

Little fire ants have also been linked to pet blindness in infested areas. Photo Credit: Cas Vanderwoude

Invasive species significantly impact the health and quality of life of Hawaii's people. Little fire ants are widespread throughout the Hilo district of Hawaii Island. They invade homes, gardens, and community parks inflicting painful stings and blinding pets. Many of Hawaii's fresh water streams are no longer safe to swim in due to *Leptospira*, an alien pathogen from Southeast Asia, which has entered the waterways through the feces of invasive rats and pigs. Additionally, once a completely mosquito free paradise, these biting and disease-carrying insects are now common in the warm wet areas throughout the state. Though a nuisance in their own right, mosquitoes further threaten the health of Hawaii's people by acting as potential vectors for human diseases including yellow fever, dengue, malaria, and chikungunya virus.



Economic impacts from a sample of high-risk species are presented here, including estimated damages from species that are currently present in Hawai'i (miconia and little fire ant) as well as potential damages from species that have so far been kept from establishing (brown tree snake and red imported fire ant).

From left to right: potential brown tree snake annual costs ($2.14B in infrastructure, health costs, and lost tourism, Shwiff et al 2010); estimated miconia annual costs ($672M in lost groundwater recharge and valuation of bird species with lost habitat, Burnett 2007); potential red imported fire ant annual cost ($200M in lost tourism, agriculture, and infrastructure damage in Hawai'i, Gutrich et al., 2007); estimated Little Fire Ant annual cost, HI County only ($194M in costs to agriculture, nurseries, residents, other sectors, Motoki et al., 2013); estimated annual need to support state, federal, county, private invasive species programs ($50M, LRB, 2002).

Invasive Species and Climate Change

Climate change will radically impact how we address invasive species in the coming decades. The 2012 Pacific Islands Regional Climate Assessment (PIRCA) Report *Climate Change and Pacific Islands: Indicators and Impacts* outlines some of the ways climate change is likely to impact invasive species issues. One major impact will be potential range expansions for some of Hawaii's most damaging species. Currently the upper elevations of Hawaii's mountains are a haven for native plants and animals because lower temperatures deter many of the invasive species found in the lowland habitats. However, with temperatures projected to rise, these invasive species are likely to expand in step. For example, if mosquitoes are able to reach higher elevations the consequences could be disastrous for the native birds who have had refuge from the mosquito borne diseases that wiped out their lowland counterparts.

One of the key research questions outlined in this report is how invasive species will respond to the various effects of climate change. Additionally, understanding how native ecosystems will respond is made more complex by the added impacts of invasives. Many of Hawaii's ecosystems and the native species within them are already greatly impacted by the anthropogenic stressors of development and invasive species, which significantly impairs their resilience to a changing climate. A near-term strategy for climate adaptation could be intensive habitat management to remove invasive species and restore native habitats to increase the overall long-term resilience of the islands. Based on current research, the effects of climate change and invasive species are often synergistic and have devastating consequences. For example, climate change threatens to increase severe weather events such as Hurricane Iselle, which battered the east side of Hawaii Island in August 2014. It is estimated that 90% of the downed trees following this storm were invasive albizia. Albizia are fast growing, towering up to 200 feet above homes and roadsides and are also brittle and easily toppled in high winds. During Iselle, the trees came down en masse taking out power, isolating communities by blocking roads, and complicating and prolonging cleanup and relief efforts. These impacts also greatly increased the economic costs of responding to this natural disaster.

The PIRCA Report stressed the need for more research on how both native and invasive species will react to the many factors of climate change. This will need to be represented in the research priorities identified by the HISC Research and Technology working group. Additionally, in preliminary discussions with representatives from both the climate change and invasive species communities of practice, a need was identified to work more closely together and share data to increase the efficacy of research, management and mitigation for both issues.

Invasive Species and People

Ultimately, healthy human communities depend on healthy natural communities. The basic elements of life, clean water, fresh air, and food, are all intrinsically linked to the health of our natural resources. Wisely managing and protecting these resources is by far the most economically and socially beneficial way to ensure the sustainability of our communities. Nowhere is this better understood in practice and culture than on islands where even small imbalances can have consequences an order of magnitude greater than those felt on larger landmasses.

Hawaiian culture is rooted in a balance with nature and reverence for all of its forms. The Hawaiian deities are innumerable and represented in every facet of the natural world including plants, animals and the elements (wind, water, and lava) through their kinolau (the many forms of the gods and goddesses). A principle tenant of Hawaiian philosophy is acting in and achieving a sense of pono (harmony) through lokahi (balance) with nature. Additionally, the term for land or earth, aina, has a deeper meaning as *that which sustains us both physically and spiritually*; illustrating a nurturing relationship that is maintained through a reciprocity in which we have a kuleana

(responsibility) to malama (care for) the aina in return. Through this intrinsic connection and kuleana for the nature of the islands, Hawaiian culture has a deeply rooted sense and knowledge of place. The kanaka maoli (indigenous people) practiced natural resource management guided by these principles as well as intense observation and extensive knowledge of the seasons and plant and animal behavior.

Invasive species upset the lokahi of place, transform landscapes that have cultural value, and threaten the sustainability of important cultural activities. For example, practitioners of traditional Hawaiian hula rely on the availability of native plants such as ohia lehua, palapalai, maile and many others as part of their practice. It is a kuleana for halau hula (schools of hula) to care for the aina, which sustains this tradition. Often today this means pulling invasive weeds that threaten to overtake the native plants. Invasive species also threaten native Hawaiian subsistence practices from invasive red mangroves and algae destabilizing and choking fish ponds to cattail plants and apple snails invading and damaging loi (taro patches).

Photo Credit: Merrie Monarch Festival

It is critical that work addressing invasive species values and incorporates cultural knowledge and perspectives. For example, when planning on-the-ground projects, we must understand the cultural context of the site and observe respectful protocols. A priority in the Public Outreach section of this plan is to increase in-reach to natural resources management staff to better understand the cultural contexts in which we work and to incorporate cultural knowledge that can support and enhance invasive species management. It is also a priority to bring in more stakeholders from the indigenous community to advise, consult, and help shape educational messages about the threats of invasive species.

Many locations have complex histories and spiritual meanings that root Hawaiian genealogies in this place. It is important to understand these relationships and support them through efforts to restore the natural and cultural resources of these places.
Kaena Point, Oahu
Photo Credit: HISC

Summary

Due to its extreme vulnerability, Hawaii is a leader in invasive species management. Through the Departments of Agriculture, Land and Natural Resources and the University of Hawaii, the State is a leader in biocontrol research and implementation with many successes including combatting nettle caterpillars and saving the native wili wili tree from a devastating invasive gall wasp. Due to strong biosecurity measures, Hawaii

remains free of snakes, notably the brown tree snake which has proliferated on Guam and driven most of their native bird species to extinction, and other highly threatening pests such as red imported fire ants. The island-based Invasive Species Committees, projects of the University of Hawaii's Pacific Cooperative Studies Unit, do groundbreaking work in combating incipient weeds and animals on the island scale. The establishment of the Hawaii Invasive Species Council in 2003 demonstrates the recognition and commitment at the top levels of government that work must be supported and coordinated across Hawaii's six lead government agencies.

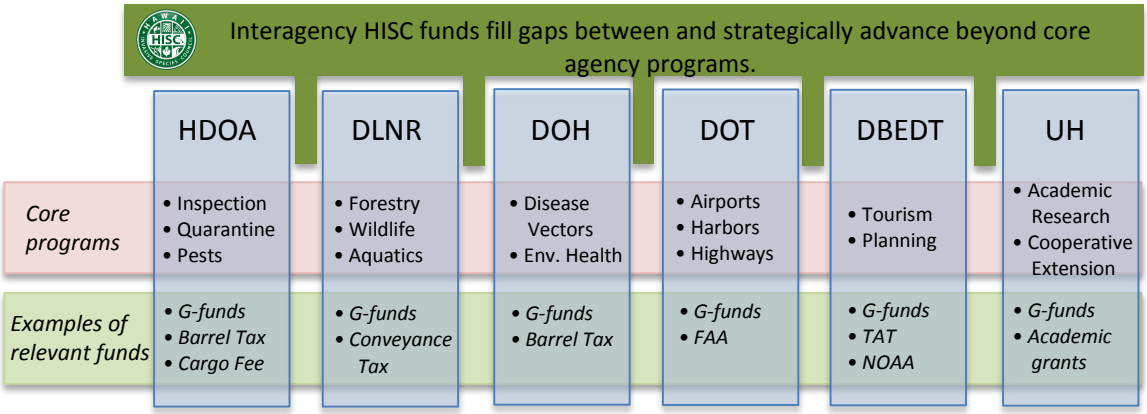
Yet despite these important achievements Hawaii has a long way to go towards being protected from and managing invasive species to minimize economic, natural resource, and human health impacts. The agencies with primary kuleana for invasive species work are chronically underfunded and understaffed. According to the State's 2013-15 Executive Biennium Budget, the Department of Land and Natural Resources makes up only 1.1% of the total state operating budget and the Department of Agriculture is even lower at only 0.4%. Many more staff are needed to effectively protect our ports of entry from invasive species. This is by far the most cost effective tool against invasives. Once they become established early detection and rapid response are critical but the costs begin to add up. Once a species becomes widespread, we often have to maintain costly and indefinite control measures to protect critical resources and we pay additional costs in the losses of ecosystem services, impacts to human health and well being, and negative affects on primary economic drivers like tourism and agriculture. Overall more support and funding is needed for invasive species work throughout Hawaii.

The goals and strategies outlined in this plan are intended to move the needle forward on priority issues through the mission and kuleana of the Hawaii Invasive Species Council. They were developed in a series of stakeholder workshops and meetings to get guidance and input on the Council's unique role to progress invasive species work in Hawaii. For more information on this please visit: hisc.hawaii.gov

ii. Hawaii Invasive Species Council Kuleana and Structure

The Hawaii Invasive Species Council (HISC) is a State interdepartmental collaboration established in 2003 by Hawaii's State Legislature. HISC was created to provide 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. It was authorized by Chapter 194, Hawaii Revised Statutes (HRS) (Appendix i. and ii.), in response to a 2002 State Legislative Reference Bureau study identifying the need to address a number of gaps in invasive species management statewide.

In addition to interagency direction and coordination, HISC collaboratively develops an annual interagency spending plan with funds allocated by the state legislature. The process includes a request for proposals from government agencies and partners and meetings with partners and applicants to review the proposed budget. The voting members of the council review, amend, and approve a final budget for each fiscal year. HISC funded projects are those that (1) fill gaps between agency mandates or existing agency programs, and/or (2) advance our collective knowledge and tools through research and innovation. These funds allow the State to strategically expand upon existing departmental programs to quickly and effectively address new invasive species threats. They are meant to complement funding for existing core programs within HISC agencies. This core agency funding is critical to provide the base infrastructure for invasive species prevention and control in Hawaii. Because invasive species are a complex, cross-sector problem, HISC funds help fill the gaps between agency mandates and make strategic advances in prevention and control



This table illustrates HISC agencies core functions related to invasive species and their funding sources and the role of HISC funds to fill gaps between these programs.

HISC funding levels have been inconsistent over the years but are critical to maintaining and enhancing Hawaii's capacity to fight invasive species.

Source	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
G Fund	$2.0	$2.0	$0	$2.0	$1.0	$0	$0	$0	$0	$0.75	$5.75
Supplemental DLNR Special Funds:											
NAR	$1.0	$2.0	$2.0	$2.0	$3.0	$2.0	$1.4	$1.4	$1.4	$1.8	$0
LLC	$0	$0	$0	$0	$0	$0	$0.4	$0.4	$0.4	$0	$0
Total	**$3.0**	**$4.0**	**$4.0**	**$4.0**	**$4.0**	**$2.0**	**$1.8**	**$1.8**	**$1.8**	**$2.55**	**$5.75**

This table shows the total amount of funding (in millions of dollars) made available to HISC through special and general funds (G Funds), by fiscal year. Special funds include the Natural Area Reserve (NAR) and Legacy Lands Conservation (LLC) programs. The original concept for the HISC was funding solely from the general revenues of the State, which appropriately reflects the cross-sector scope of work undertaken by the HISC. In years where general funds have been unavailable or insufficient, however, the DLNR, as the Council's administrative host, has been able to provide special funds to keep HISC programs in operation. In FY15, the legislature's increased investment allowed the HISC to return to its intended funding source.

Council Membership
Per Chapter 194, HRS, the voting membership of HISC is comprised of the chair or directors (or designees) of six state agencies:

- Department of Land and Natural Resources (Co-chair, administrative host)
- Hawaii Department of Agriculture (Co-chair)
- Hawaii Department of Health
- Hawaii Department of Business, Economic Development, and Tourism
- Hawaii Department of Transportation
- University of Hawaii

Participation in HISC discussions by additional, non-voting agencies, including but not limited to the Hawaii State Legislature, county governments, and federal partners is encouraged.

Support Staff

1. **Program Supervisor** – This role is filled by the invasive species coordinator of the Department of Land and Natural Resources and is primarily responsible for overall programmatic oversight, administration of HISC funds following allocation process, and management of HISC support staff.
2. **Interagency Coordinator** – Facilitates coordination activities led by HISC amongst the HISC agencies, partner organizations, and other stakeholders. This includes oversight of the 5 HISC Working Groups.
3. **Planner** – Primarily responsible for plans developed by HISC and providing technical assistance to invasive species planning efforts by HISC agencies and partners.

Working Groups

1. Resources	2. Prevention	3. Control
4. Public Outreach	5. Research and Technology	

Staff from the six HISC agencies chair the working groups and they are made up of additional relevant HISC agency staff, partner agency representatives, and other interested stakeholders. The working groups directly relate to the priority areas in the HISC strategic plan and are responsible for implementing the strategies identified. HISC's ability to achieve the goals within its 5-year plan is dependent on active participation and coordination of these groups.

Additional Capacity Needs Identified through HISC Strategic Planning Process:

- **Agency Liaison:** a staff person identified within each HISC agency who is designated to spend partial time working with HISC and on HISC related projects to have effective coordination and collaboration among all agencies and with partners.
- **Statewide Outreach Coordinator**
- **Statewide Data Coordinator**

III. Goals, Strategies, and Evaluation Measures

The goals outlined in this plan were developed through a collaborative stakeholder process and reflect the top priorities relating to invasive species in Hawaii (see Appendix iii.). The strategies are based on HISC's role and kuleana towards those priorities as outlined in Chapter 194, HRS, the statute establishing HISC.

i. Overarching Goals, Strategies and Evaluation Measures for HISC

Goal: provide strategic policy and fiscal direction, coordination, and planning among state departments and other stakeholders.

Strategies:

- Meet at least twice annually.
- Revitalize HISC Working Groups (Resources, Prevention, Control, Public Outreach, Research and Technology) by designating working group chairs from HISC agencies, reengaging former and current participants, and engaging new critical stakeholders.
- Provide annual reports on budgetary and other related issues to the legislature twenty days prior to each regular session.
- Coordinate legislative initiatives related to invasive species during each regular session by providing technical assistance on priorities and developing legislation, sharing information among agencies and partners, and providing testimony.
- Coordinate and facilitate an annual funding process to allocate funds designated to and dispersed by the HISC.
- Coordinate and facilitate activities related to the annual Hawaii Invasive Species Awareness Week.

Evaluation Measures for HISC

- Number of council meetings annually.
- Overall status of goals within priority areas (prevention, control, research, outreach).
- Policy statements (e.g., resolutions, testimony, legislative reports) produced annually.

ii. Resources

Goal 1: Organizational and resource shortfalls with respect to invasive species are identified and prioritized for each HISC agency.

It is critical to identify the capacity shortfalls within HISC agencies. It will allow a clearer understanding of current vs. needed capacity and facilitate prioritization efforts for support of agencies to fulfill our kuleana with respect to invasive species as well as for support of other entities working in the state who fulfill vital roles. A better understanding of each agencies capacity and need will also allow for creative

collaborative solutions and opportunities for increased cross-departmental collaboration.

Strategies:

- Identify roles, responsibilities, and priorities related to invasive species for each HISC agency.
- Identify roles, responsibilities, and priorities of other organizations working in the state on invasive species issues.
- Work directly with designated staff within each agency to identify current capacity and shortfalls.
- Use resources working group structure to provide a peer or external review process to assist agencies in identifying shortfalls.
- Include information from this process in HISC annual reports and legislative packages.

Goal 2: Dedicated and sustained funding mechanisms and sources for prevention, control, outreach, and research and technology.

Dedicated and sustained resources for invasive species work are necessary for the effective management of invasive species in Hawaii. To achieve meaningful long-term results, the state must recognize this as a priority issue to support in perpetuity, as inconsistent support results in piecemeal work and significant backslides in forward progress. To achieve our mission, resources must be available for ongoing prevention, emergency response, sustained control, effective outreach, and innovative research and technology.

Strategies:

- Identify all funds currently available for invasive species work, identify how they address core functions of invasive species management, and assist agencies and organizations in acquiring these funds.
- Identify opportunities for and assist the development of public private partnerships.
- Engage private funding organizations through the Hawaii Community Foundation and industry partners to be a part of the solution.
- Advise the governor and legislature on budgetary issues.

Goal 3: Cost benefit analysis is available for prevention, early detection, and control of invasive species in Hawaii.

Cost benefit analysis will provide science-based, quantitative analysis of the impacts of invasive species, both present and not present in Hawaii. Clearly articulating the costs and benefits of managing invasive species will support the need for sustaining this work,

economically support use of the most efficient management actions, and provide decision based tools for setting management priorities, goals, and methods used.

Strategies:

- Request a new Legislative Reference Bureau study to estimate the total cost of implementing effective invasive species programs in Hawaii.
- Create a prioritized list of economic questions and analyses needed.
- Work with economists to determine data that are needed in models and create templates for data collection.
- Facilitate data and information sharing among agencies and organizations to pull data together and provide for analysis
- Work with economists to do analyses.
- Act as a clearinghouse for data, economic analysis, and other related information.

Evaluation Measures for Resources Strategies:

- Level of funding received by agencies for invasive species work (funding level need vs. funding level met).
- Level of funding allocated and available for disbursement by the HISC.
- Number of new stakeholders engaged and resulting capacity support.
- Number of reports, studies, materials that cite HISC funded economic studies and data.

iii. Prevention

Goal 1: Introduction of invasive species into Hawaii and their movement intrastate is prevented.

Prevention is the most cost effective management strategy for invasive species. It requires that all agencies and organizations have clear mandates and are able to work together quickly and effectively. Prevention must be supported sustainably so that on going efforts and resources are maintained when emergency responses arise.

Strategies:

- Coordinate and promote the state's position on federal issues pertaining to invasive species prevention, in particular interstate and international movement of pests.
- Identify roles, responsibilities, and authorities by all agencies involved in inspections.
- Serve as a forum to identify and prioritize statutory changes or rule amendments needed relating to authorities and inspections.
- Increase interagency cooperation and support to implement prioritized changes needed.

- Increase interagency cooperation to share data and information between state and federal agencies.
- Lead tabletop exercises to identify gaps and breakdowns in the process and address them.

Goal 2: Risk assessments are developed and utilized for all priority taxa.

Risk assessments are a critical tool in prioritizing prevention and response activities. Having these tools in place provides consistent methodologies across agencies, reliable pathway and impact analysis, and data for meaningful prioritization of management activities.

Strategies:

- Provide a forum to review need and prioritize risk assessment development.
- Provide a forum to review existing tools for adaptation to Hawaii's needs.
- Identify and support agencies to host assessment functions based on kuleana for taxa.

Evaluation Measure for Prevention Strategies:

- Rate of pest detections at ports of entry.
- Number of species and pathways assessed for risk.
- Qualitative data from agency and organizational staff on increased cohesion, collaboration, and effectiveness.

iv. Control

Goal 1: HISC has an official list of invasive species based on criteria and processes described in HISC administrative rules.

Strategies:

- Define invasive species for purpose of HISC list.
- Develop method for selecting species and process for review and addition to the list.
- Promulgate administrative rules that describe the listing process.
- Develop and get approval of HISC invasive species list.

Goal 2: Capacity for early detection and rapid response is enhanced and maintained in each county.

Each county must have sustainable capacity for early detection and rapid response to invasive species for all taxa (plants, invertebrates, vertebrates, aquatics, plants diseases, etc.).

Strategies:

- Identify roles, kuleanas, capacity, and gaps for detection and response.
- Prioritize gaps and work with agencies to advocate for and secure additional resources.
- Increase collaboration with county governments.
- Develop prioritized list of species and create ICS based response plans for them.
- Act as statewide coordinating body for responses to ensure consistency and facilitate information sharing.

Goal 3: A comprehensive pest reporting system is in place for Hawaii that integrates the pest hotline with online components, including desktop and mobile interfaces.

A key component of detection for control is public engagement and reporting of pests. An institutionalized reporting system integrating all forms of modern communication will make it easy and efficient for the public to report potential invasive species increasing detection and streamlining the process and communication among agencies to initiate confirmation and response.

Strategies:

- Work with CGAPS and other relevant agencies and organizations on tool design and development.
- Design information flow system on the backside of reporting tool to facilitate communication and information flow for appropriate response initiation to reports.
- Assist HISC agency with kuleana to house the system.

Goal 4: Hawaii's biocontrol program is supported and capacity is increased.

Biocontrol is a key tool for the management of invasive species and Hawaii is a global leader in effective biocontrol programs. To continue and maintain this legacy of excellence, we must have adequate facilities and staff, an informed and supportive public and decision makers and build strong international partnerships.

Strategies:

- Provide data and information to the outreach working group to develop outreach materials.
- Collaboratively develop prioritized list of biocontrol targets.
- Facilitate discussions to identify and prioritize needs and advocate for them.
- Facilitate collaborations within Hawaii among biocontrol stakeholders, as well as, participation in international collaborations.

Evaluation Measures for Control Strategies:

- HISC list of invasive species in place.

- Progress towards capacity goals identified in gap analysis of early detection and rapid response capacity on each island.
- Number of pest reports received via integrated reporting tool.
- Public attitudes relating to biocontrol.
- Progress towards capacity needs for biocontrol.

v. Public Outreach

Goal 1: There is statewide coordination of invasive species outreach.

Support for invasive species work relies on strong understanding and support of the issues from the general public, decision makers, and industry. Statewide outreach campaigns should address the overarching priorities for invasive species issues in Hawaii. Statewide coordination will result in clear consistent messages that increase stakeholder awareness, support, and engagement.

Strategies:

- Work with CGAPS and contractor to develop a coordinated outreach strategy to develop outreach messages for statewide invasive species priorities.
- Develop and disseminate outreach media and materials.
- Act as centralized information hub for invasive species outreach.

Goal 2: All stakeholders are informed and engaged in invasive species efforts.

Strategies:

- Identify stakeholder groups and develop personas for outreach.
- Develop and work on collaborative projects with other stakeholders (i.e. partner workdays, exchanges etc.).

Goal 3: Outreach and collaborations on invasive species issues are culturally relevant and inclusive.

It is important that invasive species work have broad support of our missions and strategies across cultures. All of our work should strive to be culturally inclusive and ensure that lands and practices are respected.

Strategies:

- Translate outreach materials into multiple languages.
- Engage Aha Moku and other cultural leaders.
- Provide in-reach to the invasive species community of practice through identification and participation of cultural events that currently exist as well as develop new opportunities (workshops, webinars, talk story).

Evaluation Measures for Outreach Strategies

- Stakeholder attitudes towards and understanding of priority invasive species issues.
- Increased stakeholder engagement.
- Participation in educational opportunities and increased understanding of local cultures.
- Number of materials produced in other languages.

vi. Research and Technology

Goal 1: An interagency research strategy plan is developed.

A comprehensive interagency research plan will ensure that invasive species research is prioritized, coordinated, and collaborative. It will prioritize research that is interdisciplinary and has direct management applicability. It will also emphasize and facilitate structures for results to be made publicly available.

Strategies:

- Identify interagency research priorities.
- Facilitate priority setting and planning process.
- Identify and connect researchers with users.
- Work with Resources working group to reestablish funding for research priorities.

Goal 2: Data is shared among agencies and organizations and made publicly available when appropriate.

Strategies:

- Identify data across agencies and partners.
- Assess current data management tools and practices statewide and needs across agencies and organizations.
- Explore information/data management systems.
- Work collaboratively to standardize data sharing with focus on data being consistent, accessible, easily summarized, and reported on.
- Implement a pilot study with a limited group for trials.

Goal 3: The Hawaii Ant Lab (HAL) capacity is increased and sustained.

HAL is a critical institution working on invasive ant issues in Hawaii and across the Pacific. Its maintenance will provide interdisciplinary research, develop tools and methods for prevention and control, and manage coordinated responses in which there are direct feedback loops between the research and its applications.

Strategies:

- Maintain ant species as a high priority invasive species.
- Provide a forum for sharing new information and research results within Hawaii and across the pacific.
- Provide technical assistance and support in the development of a statewide ant plan.
- Identify opportunities to institutionalize HAL within an appropriate agency.

Evaluation Measures for Research and Technology Strategies

- Establish timeline and benchmarks for development of research strategy plan.
- Funding directed towards research priorities identified.
- Track applications of research produced.
- Establish timeline and benchmarks for development of statewide ant plan.

IV. References

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V. Appendices

i. Chapter 194, Hawaii Revised Statutes

Section

194-1 Definitions
194-2 Establishment of council; duties
194-3 Lead agencies; accountability
194-4 Relation of chapter to other laws
194-5 Entry; private property
194-6 Entry; public property
194-7 Rules

Cross References

Coqui frog; designation as pest, see §141-3.
Landowners liability for access to control invasive species, see chapter 520A.
Noxious weed control, see chapter 152.
Plant, animal, and microorganism, etc., imports, see chapter 150A.

[§194-1 Definitions.]

As used in this [chapter], unless the context requires otherwise: "Council" means the [invasive species council]. "Department" means any entity that is a member of the [invasive species council] established under section [194-2(a)]. [L 2003, c 85, §2; am L 2004, c 10, §16; am L 2006, c 109, §2].

[§194-2 Establishment of council; duties.]

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

(1) Maintain a broad overview of the invasive species problem in the State;

(2) Advise, consult, and coordinate invasive species-related efforts with and between the departments of agriculture, land and natural resources, health, and transportation, as well as state, federal, international, and privately organized programs and policies;

(3) Identify and prioritize each lead agency's organizational and resource shortfalls with respect to invasive species;

(4) After consulting with appropriate state agencies, create and implement a plan that includes the prevention, early detection, rapid response, control, enforcement, and education of the public with respect to invasive species, as well as fashion a mission statement articulating the State's position against invasive species; provided that the appropriate state agencies shall collaborate with the counties and communities to develop and implement a systematic

approach to reduce and control coqui frog infestations on public lands that are near or adjacent to communities, and shall provide annual reports on the progress made in achieving this objective;

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

(A) Quarantine preemption;

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

(C) First class mail inspection prohibition;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(16) Incorporate and expand upon the department of agriculture's weed risk

assessment protocol to the extent appropriate for the council's invasive species control and eradication efforts; and

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

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

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

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

(A) Business, economic development, and tourism;

(B) Health; and

(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]

[§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].
Note: The amendment made by L 2014, c 218, §8 is not included in this section.

[§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].

ii. Table of HISC Statutory Responsibilities

(R and blue highlight = Resources related item, P and purple highlight = Prevention related, C and green highlight = Control related)

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	R
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 specie, as well as, fashion a mission statement articulating the state's position against invasive species	
5	Coordinate and promote the State's position with respect to federal issues, including: a. Quarantine preemption; b. International trade agreements that ignore the problem of invasive species in Hawaii; c. First class mail inspection prohibition; d. Whether quarantine of domestic pests arriving from the mainland should be provided by the federal government; e. Coordinating efforts with federal agencies to maximize resources and reduce or eliminate system gaps and leaks, including deputizing the United States Department of Agriculture's plant protection and quarantine inspectors to enforce Hawaii's laws; f. Promoting the amendment of federal laws as necessary including the Lacey Act Amendments of 1981, Title 16 United States Code sections 3371-3378; Public Law 97-79, and laws related to inspection of domestic airline passengers, baggage, and cargo; and g. Coordinating efforts and issues with the federal Invasive Species Council and it's National Invasive Species Management Plan	P
6	Identify and record all invasive species present in the State	C
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	R
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	R
10	Advise the governor and legislature on budgetary and other issues regarding invasive species	R
11	Provide annual reports on budgetary and other related issues to the legislature twenty days prior to each regular session	R
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	R
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	C
14	Review the structure of fines and penalties to ensure maximum deterrence for invasive species-related crimes	C
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	P
17	Perform any other function necessary to effectuate the purpose of this chapter	

iii. Full Listing of Priorities and Rankings from Statewide Planning

The items listed were generated through a facilitated brainstorming process at a statewide strategic planning workshop and are listed in no particular order. The HISC Priority Ranking Score indicates how many votes an item received during a dot exercise at the workshop (higher number = higher priority and blue highlighted fields indicate highest-ranking priorities).

Prevention	
Strengths	**HISC Priority Ranking Score**
Federal process of data collection at inspections	
Relatively savvy public	
Cargo fee to pay for inspections	5
ISC outreach programs	1
Post entry quarantine that we do have in place	
Weed risk assessment tool	3
New DAR leadership is looking at mandates, responsibilities etc. *Potentially good model for all organizations and defining how they relate to the issue*	
People outside the state see Hawaii as special/unique	1
CTAHR's new agro-security position	1
Forest pest pathway risk assessment to help guide measures	
Non-conservation agencies engagement and trying to make commitments as well. (i.e. Highways SNIPP Program)	2
Capital in the size of the stakeholder network	

Physical size of the state	
Additional notes: Is inspection prevention or EDRR?, it's a border issue. EDRR for insects, interstate vs. intrastate, 80% of the effort is/should be in prevention	
Weaknesses	**HISC Priority Ranking Score**
Little Department of Defense cooperation	
Lack of enforcement of extensive Department of Defense guidelines	
Limited diagnostic abilities for micro organisms	1
Lacking on state side of inspections (authority, science-based, risk-based)	1
Translation of public information to action/ behavior change	
Interstate movement of pests	10
Disconnect between organizations and with residents of the Hawaii	
Reduction in Force lay-offs: DOH staff down from 40-4. Resources!	3
Vectors: i.e. mosquitoes, science-based work in state agencies (budget restrictions and gap w/researchers)	1
Absence of private sector	1
Pro-business atmosphere (especially w/recession)	
Lack of regulatory cooperation and networking (i.e. specific needs of Hawaii secondary at Federal level)	
Post entry quarantine we do not have	1
Laws: wide reaching gaps (i.e. difference between animals and plants)	2
Lack of monitoring with pet stores and other enterprises	
People want to spend money on what they can see, how do we quantify and promote what we get from prevention?	1
Cohesion: statutory, regulatory, execution, competing mandates, preemption	4
Separate functions competing for resources (prevention, control, EDRR etc.)	
Lack of source for sustained funding	7
Human capacity to accomplish	1
Game Changers	**HISC Priority Ranking Score**
Increased movement of military between Guam and Hawaii	
Marine training in Perth	
Department of Defense – introductions without engagement	2
Engage HECO workers, ports, highways, BWS ground crews, road crew, and construction workers/contractors	1
DOA/USDA being here today (*arrived later*)	
Risk Assessment for insects, vertebrates (like with plants)	11
Legislative funding to programs i.e. vector control (3.8 million would restore full vector control)	8
Reinstatement of dog detections	7
Cohesive messaging	
Shift to focus on prevention	2
Work better with industry (i.e. nursery, etc.) Encourage proactivity and self policing in place of regulation	
Create our own nursery certification program (not just based on CA), more tools like Plant Pono	

Tax/ fee on purchase of common vectors (plants, animals, etc.)	2
Marketing plan and business plan	1
Follow DAR's internal assessment	
Joint inspection facility	1
Engage Hawaii Tourism Authority to be more part of the process (marketing, funding, etc.)	5
Engage farm and nursery workers	2
Deal with federal preemption	3
Understand the culture we are working for	
Prioritization of prevention so efforts continue despite the latest crisis	5
Work with nurseries to inspect shipments, they are a huge pathway for invasive species coming in	3

Early Detection and Rapid Response (EDRR)	
Strengths	**HISC Priority Ranking Score**
Good group of field biologists on the ground	
Good with certain species (CAPS species), better with plants	
Technology: smart phones and information empowerment	
A lot of people on the ground in each county and a high level of training	
Notification protocol for detections coming through UH *(detect a lot but…)*	
Weed risk analysis staff (Bishop Museum Herbarium)	
643-pest	
Plant Dr. App through CTAHR	
Structure and function of the Island Invasive Species Committees	1
Hull fouling and ballast water program	
Spatial data and visualization	
Island Invasive Species Committees are not part of a state agency allowing flexibility in approach (and more public trust, public more likely to let non-state worker on their lands)	4
Island Invasive Species Committees are able to hire rapidly, but need funding	
HISC ability to draft admin rules	
A lot of communication among NGOs, all done by NGOs, little communication from departments (plants)	
Understand the culture we are working for	
Additional notes: Does EDRR actually exist (from an entomological perspective) i.e. LFA on Maui, EDRR has to occur at the point of entry, for land managers intervention is important, distinction between detection	
Weaknesses	**HISC Priority Ranking Score**
Training people on the ground, beyond the biologists	2
Lack of institutional EDRR program at the Department of Land and Natural Resources	
Lack of comprehensive EDRR beyond certain species	2
Good on plants, less to no capacity for others	
Need the infrastructure to take advantage of technology	
Rapid Response roles not clear or coordinated	1

Access to information both internal and external	4
Landowner recalcitrance	
Current plant pathogen policies are prohibitive to research	1
Lack of clear process and decision protocol to enact EDRR (for government body)	
USDA APHIS Wildlife Service capacity reduced	
Following success by implementing solutions (i.e. Christmas Trees)	
Lack of rapid response fund in place	1
Lack of capacity to respond to aquatic pests (including freshwater)	
Lack od surveillance for mosquitoes (disease vectors), prior to reductions in force had 100 monitoring sites on Oahu – it's down to 6	
Some species (i.e. insects) are very difficult to detect	
Lack of response plans	1
Loss of capacity for Bishop Museum Botany	2
Lack of herbarium capacity on each island (only on Oahu currently)	
Capacity to respond to 643-pest and other notifications	2
Hull fouling and ballast water program not always there	
Lack of dedicated funding	6
Legal expertise capacity to pursue legal options	
Confusion over Department of Agriculture legal ability to respond to threats in a timely way	1
Willingness to apply private property access law, needs more work to be applicable	
Not presenting EDRR successfully	
Policy and regulatory cohesion	1
US Mail	3
How do we define these categories?	
Adequate surveying and trapping	
Evaluation of success and justification of institutionalized EDRR	
Documentation of detection, delimination, success if achieved	
Lack of reliable risk assessment after detection	1
Invasive Species Committees need access to funding to ramp up when responses needed	3
Invasive Species Committees don't have mandate and authorities	
Game Changers	**HISC Priority Ranking Score**
Climate change	
Drones	1
Increase education (i.e. high school required botany, more interpretation at trails etc.)	
Technology – smart phones empowering people	
Engage volunteer networks (i.e. Master Gardeners) expanding eyes and ears	2
DOT is now funding service	1
Institutionalize online pest reporting that works with/ integrates hotline and an app	8
Education and outreach + utilization of law for private land entry, more engagement	
HISC list of invasive species that could be acted on	4
Changing/ update existing noxious weed list	1
US FWS taking a much more hands on approach to biosecurity	
Early detection botanist and entomologist on each island	4
Info boards at trail heads w/contact info and reporting info	

Using social media	
Decent facilities	1
Contingency funds	2
Department of Defense partnership for equipment use for EDRR	
LFA sniffing dogs	1
HISC drafting administrative rules	4
Legal approaches: require landowner to control, determine liability	3
Department of Land and Natural Resources restructuring approach to invasive species, attached to invasive species on the ground	1

Control	
Strengths	**HISC Priority Ranking Score**
The Pacific Cooperative Studies Unit	
Biocontrol: getting momentum at the University of Hawaii, acceptance, and resources	4
Little fire ant premier on Maui (all islands)	
Pesticide registration program	2
First predator proof fence at Kaena	2
CTAHR's training capacity	3
Skilled personal on each island	
Intellectual capacity and expertise in Hawaii	
Watershed Partnerships are coordinating across lands	
OISC collaboration with army for control	
New Zealand and Australia taking lead and being able access their data	
Hawaii County ordinance for control on private property for invasive species or dangerous species	
Isolation	
Weaknesses	**HISC Priority Ranking Score**
Biocontrol – not doing enough, need facility, public perception issues	2
Public perception generally	1
Perception it can all be done by volunteers	
Prioritizing what, where, when, to control	3
Discrepancy between cultural and socioeconomic profile of conservation professionals and user groups	
All Hawaii crops are minor crops which limits treatment options due to small programs	1
Some control projects are doable but need time which makes it a hard sell and requires long term commitment	
Conflicting agency mandates	2
Access to a statewide database on how to control	
Differing levels of access to control tools	
Not using technology and tools from other places (i.e. poisons, traps, snares)	
Lack of coordination among landowners	
Lack of recognition by tourists and some locals of prevalence and domination of invasive species in Hawaii environment	
Public misperception of how and what we control	

Growing public resistance to pesticides	
Unpublished results	
Language barriers with partners and stakeholders, no longer have the resources to overcome these	
Restrictive policies on aerial control	1
Lack of updated management plans for species (i.e. Miconia)	1
California has gotten ahead on hull fouling regulation	
We're risk adverse	
High turnover of skilled people due to lack of funding	
We're action averse	
Facilities	
Environmental policy/regulation can be used to prevent/delay work getting done (i.e. EA process, biocontrol)	1
Game Changers	**HISC Priority Ranking Score**
Regulatory and socio-political impediments to using toxicants in the state	1
More biocontrol (joint facilities, post-release monitoring, international collaborations)	10
Threat when pesticide regulatory program people retire	1
Tools for control (database of how too, access different places, etc.)	
Understand the culture we are working for	1
Herbicide ballistic technology	1
Public campaign all speaking with the same voice about control	
Drones	
More sophisticated cost/benefit analysis of control	5
Identify 2-6 species we know we can control and show success	
Understanding of how Island Invasive Species Committees work on each island	
Comprehensive plans updated with everyone on board	
Growing public resistance to pesticides (requests for anti-pesticide legislation)	2
Ballast water and hull fouling national and international advances	
Establish Aquatic Invasive Species Team on each island	6
Policy statement on ungulates as both game and invasive species	3
View certain weeds as potential economic drivers	
Dedicated funding source	12
Getting civil defense involved in hazard mitigation	
Utilize tools that already exist (i.e. toxicants, tree removal equipment, technology)	
Have tourists pay into systems that fund work	6

Outreach	
Strengths	**HISC Priority Ranking Score**
Really good outreach on each island	1
Island Invasive Species Committees	6
Media is interested	
Hawaii residents more aware in general (75% would support a tax etc.)	
Expanded outreach through social media by watershed partnerships, island invasive species committees, etc. and all sharing	
Kupu, Hawaii Youth Conservation Corp, etc.	2

UH Extension, CTAHR-Cooperative Extension Serivce	3
Having the island based community approaches	
Big Island Invasive Species Committee professional public relations contract	
Legislative field trips	1
Invasive species information boards in Hawaii airports	
Additional notes: in rural areas main buy-in to conservation is job building, Kau Forest Reserve management plan process hired and worked with people from the local community	
Weaknesses	**HISC Priority Ranking Score**
Statewide coordination of outreach	6
Capacity on Oahu and across the state	
Media doesn't always pick up the stories	
Public commentary responses to media display so much misinformation/misunderstanding	1
Messages get lost	
Digital communication not as effective in rural areas, need to build relationships	
It is hard to know if you are having an impact	1
Divide between agricultural and conservation communities	4
Lack of really targeted strategy for specific stakeholders specifically to get funding	3
Gaps in UH extension	
Oahu-centric	
With technology people are only going to hear what they want to hear (selective media choices)	
Reluctance at administrative level to get honest feedback from the community, hear what they are really saying: outreach coupled with listening	1
The community doesn't feel heard	
Legislative outreach	1
Cultural barriers	2
State does not highlight invasive species management success in North West Hawaiian Islands	
Need to coordinate with Hawaii Tourism Authority, Department of Transportation, Federal Aviation Administration, Department of Land and Natural Resources to require a video and announcement on all flights into Hawaii about the impacts of invasive species and why they have to fill out customs declarations	3
Game Changers	**HISC Priority Ranking Score**
Coordinated messaging (but with the flexibility and getting the right messenger) and unified professional strategic marketing	8
Platform/ mechanism to debunk misinformation	
The upcoming agro-security position to bridge divide between agriculture and conservation	1
Biosecurity program – it's own comprehensive discipline at the University of Hawaii	
Securing tax dollars for consistent funds from support	2
Cost-effective ways to get your message out	
Getting outreach targeted at right age groups (educate the kids)	

Engaging community to work in the field	1
Benefit of more joint messaging by groups in the room (HISC, federal and state agencies, UH, Private Orgs etc.)	3
Drones	
Understand the culture we are working for	
Engaging the kapuna	3
Change up the type of outreach/community involvement	
More people will be engaged if they do more than weed removal work	
Try different media (radio, video blog, etc.)	
Discussion forums on Invasive Species Committee websites for community members to ask questions and get answers	

Research and Technology	
Strengths	**HISC Priority Ranking Score**
Hilo bridging gaps with experimental forests	
Department of Defense requirement to find new technology to meet requirements	
US FS and USDA facilities	1
Database Management and GIS	3
Adoption of international protocols (i.e. fuel efficiency standards) can stimulate technology advancement moving faster by increasing economic based opportunities (i.e. hull fouling)	
Start of a great program	
Hawaii Ant Lab	3
The Nature Conservancy interest in funding new technology	
New, emerging research topics introduced through students	2
Weaknesses	**HISC Priority Ranking Score**
Communication gaps between researchers and management priorities	3
Facilities (labs, etc.)	
Funding	6
Economic analysis	2
Technology development is high risk	
Vetting of information and results/ local peer review	3
Loss of capacity for gap filling projects	1
Data recording and tracking in state agencies	2
Piecemeal data, no standardization	4
Plan for sustainability of program	
Lots out there, not very coordinated	
Don't do a good job of collecting samples, data, etc. of things we control	
Bishop Museum financial situation	1
Game Changers	**HISC Priority Ranking Score**
New and emerging micro detection technologies (RGI)	
Integrating new technology with Island Invasive Species Committees and education platforms	1

Work directly with development of herbicides and pesticides	
Interagency research strategy plan for invasive species	4
Match making with industry and stakeholders	1
Continue to recognize the value of partnerships and matching funds	
Drones	1
Engage keiki in research projects	1
Field deployable detection units for microbes	1
Understand the culture we are working for	
Create a biosecurity and invasive species college within the University of Hawaii	3
Prioritize research based on need	
Funding for remote sensing/ unmanned aerial vehicle research	2
Incorporate more culturally tied research	1