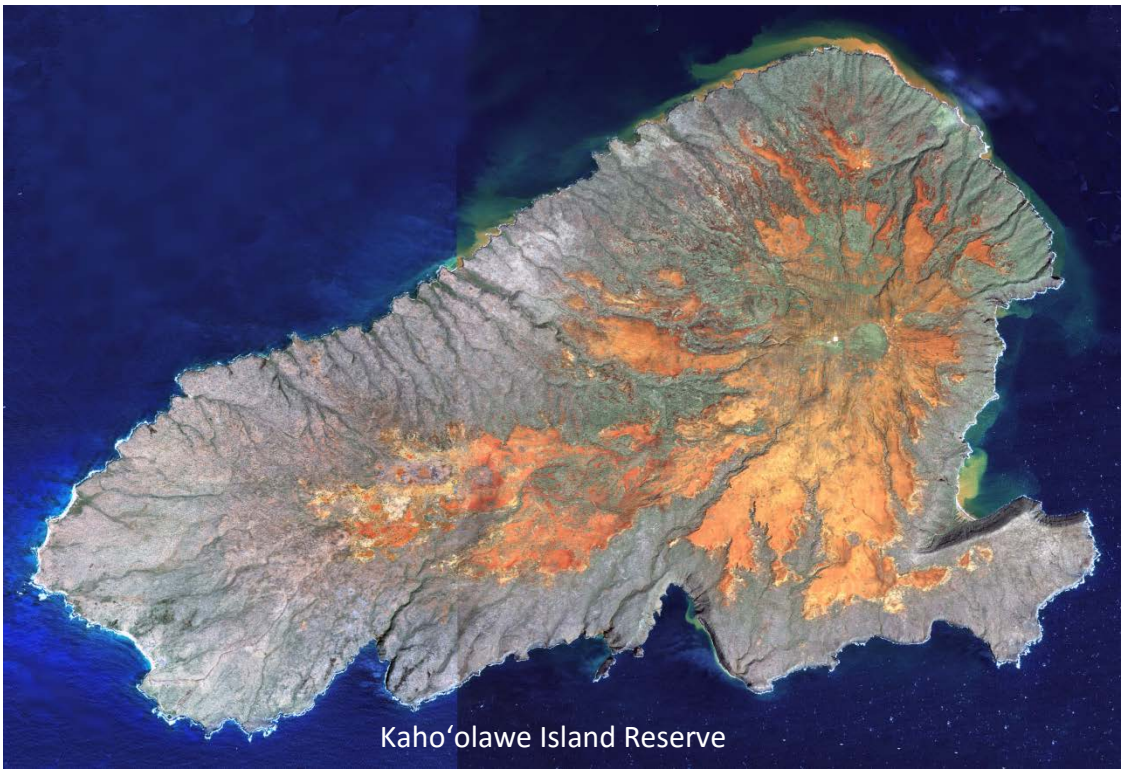
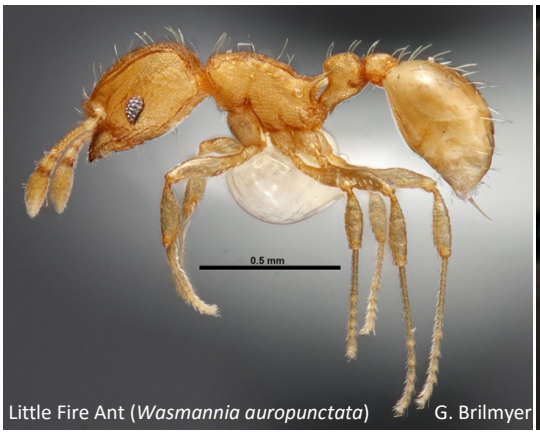
Biosecurity Implementation Plan for Kahoʻolawe Island Reserve

Final Report to the Hawaiʻi Invasive Species Council, FY16 -17





Kahoʻolawe Island Reserve Commission, January 2017

Hawai'i Invasive Species Council- Final Report

Project Title: Biosecurity Implementation Plan for the Island of Kaho'olawe
Project Start/Completion Date: October 1st, 2015 – December 31st, 2016

Primary contact: James Bruch, jbruch@kirc.hawaii.gov 808-243-1220. Secondary Contact: Kelly McHugh, Kmchugh@kirc.hawaii.gov 808-243-5886. Project Assistant: Lyman L. Abbott, Labbott@kirc.hawaii.gov. Submitted by the Kaho'olawe Island Reserve Commission (KIRC) - 811 Kolu Street Suite 201, Wailuku, Hawaii 96793. Telephone: 808-243-5020. Website: http://www.kahoolawe.hawaii.gov/home.php

Executive Summary:
From 1993-2003 Kaho'olawe was the site of an unexploded ordnance (UXO) clearance project. During this time and discovered in 1996, fountain grass (*Pennisetum setaceum*) was likely introduced to Kaho'olawe from people or equipment from other islands for various support projects. Declared a noxious weed by the Hawai'i Department of Agriculture, this invasive species poses a threat to native habitat restoration on Kaho'olawe. Since its discovery the KIRC has managed this threat as well as other invasive alien species (IAS) including the recent introduction of khaki weed (*Alternanthera pungens*) previously not found on the island. The purpose of this project is take a proactive approach to invasive species management on Kaho'olawe to prevent new introductions and eradicate priority target species through the creation and implementation of a comprehensive biosecurity plan.

The KIRC Biosecurity Plan will include implementation and with a multi-faceted approach at addressing various components:

1) A comprehensive biosecurity plan will be written to identify recommended protocols, vectors and quarantine procedures.

2) Ports of departure and entry to Kaho'olawe will be targeted for signage and all vessels entering into the reserve will be required to submit a compliance form.

3) The KIRC nursery currently under construction will have a portion of the plan dedicated to nursery protocols and transportation of materials to island.

4) Career development training will take place through the KIRC Hui Kāpehe Program with a focus on invasive species management.

5) Educational materials regarding biosecurity procedures and safeguards will be distributed electronically as well as during the required orientation provided by KIRC staff prior to access to the island though the Volunteer Program and access request process.

6) All priority invasive species threats will continued to be surveyed for and controlled at Kihei boat house and on Kaho'olawe.

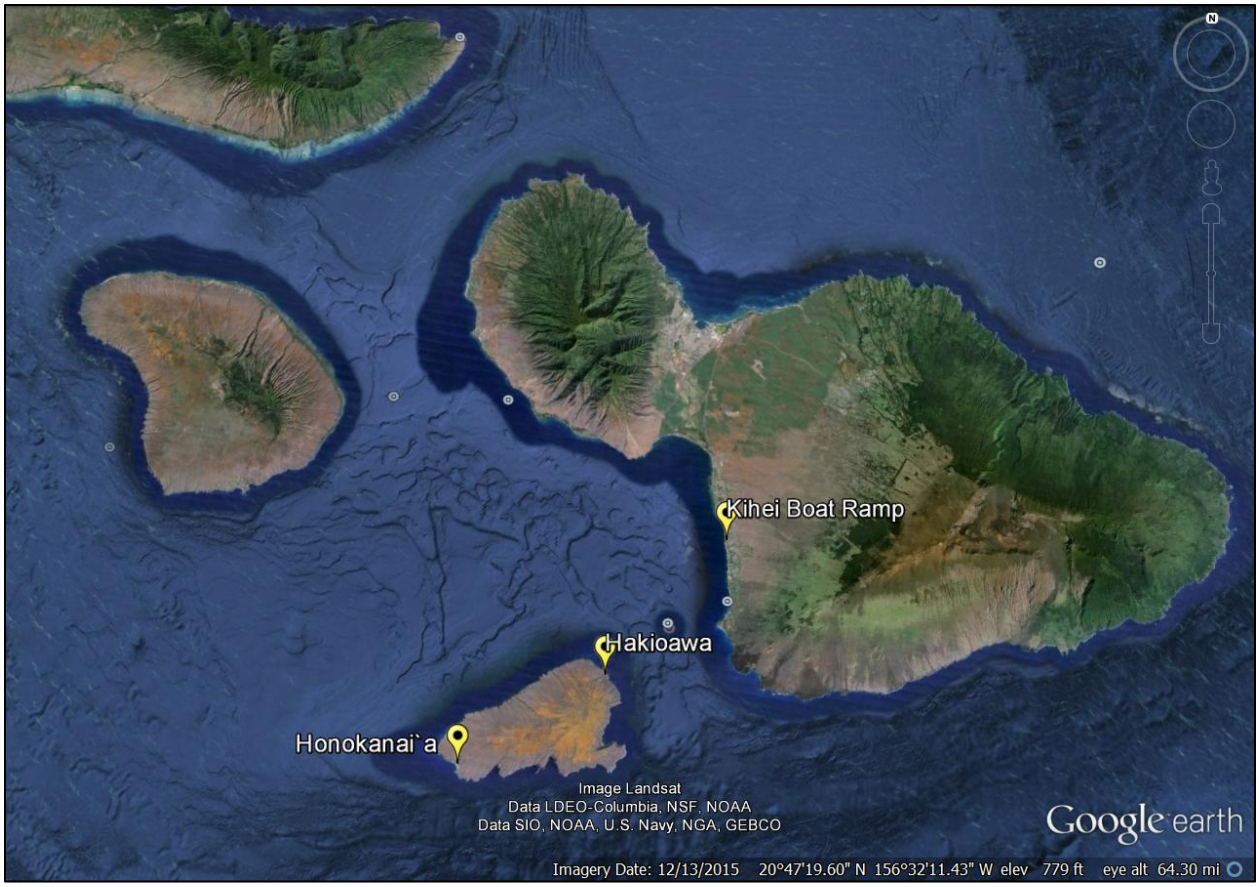


Figure 1. The main ports of departure and entry to the Kahoʻolawe Island Reserve.

Figure 2. Fountain grass (*Pennisetum setaceum)* is the number one priority IAS target species marked for control and eradication from Kahoʻolawe through this project.

HISC Guiding Plans & Priorities: This project focuses on the goal of Preventions: Introductions of invasive species into Hawaii and their movement intrastate is prevented as developed by the 2015-2020 HISC strategic planning process. A defined biosecurity protocol for the KIRC at ports of departure and entry addresses the prevention of moving invasive species interisland from Maui to Kahoʻolawe through education and accountability of all people, stewardship organizations and vessel operators entering the reserve.

Two overarching goals in the Recommendations of the Regional Biosecurity plan for Micronesia and Hawaiʻi are addressed1) Improving engagement from all levels of society in regards to biosecurity and invasive species and 2) Improving biosecurity for terrestrial, freshwater, and marine systems within the jurisdictions and across the region. Vessel operators entering the reserve will be educated about Invasive Alien Species (IAS) and unwanted introductions to the Reserve especially in regard to the marine environment. The protocols developed will reduce the risk of new introductions of IAS to Kahoʻolawe. The training of Hawaiian students through the Hui Kāpehe program will increase the knowledge base of IAS on a community level.

Three jurisdictional recommendations for Hawaiʻi include 1) Marine Systems Recommendations, 2) Regional Partnerships Recommendations and 3) General Biosecurity Recommendations. Signage will be placed at the Kihei property adjacent to the Kihei boat ramp and at the Kihei boat house informing of biosecurity to prevent invasive species from entering the reserve. Written materials including a compliance form will also be distributed all vessel operators who pay for an "open waters permit" to access the Reserve.

HISC priorities include 1) Research: detection/treatment methods at ports, 2) General early detection/control capacity of incipient plant species and 3) Interagency Little Fire Ant response and 4) Island Based Outreach Projects. These priorities addressed through implementation of the biosecurity protocols developed by the biosecurity plan for the island of Kahoʻolawe.

Summary of Deliverable Progress/Tasks Started and/or Completed

Table 1 lists a summary of Tasks and Deliverables to HISC under the Biosecurity Implementation Plan.

	Task/Deliverable	Percent Progress	Status
1	1 Biosecurity plan produced	100%	Available at http://kahoolawe.hawaii.gov/plans
2	Biosecurity signage (8) installed	100%	Signs installed
3	Biosecurity information with 2 SOP's added to KIRC website	100%	Vessel Registration added to website. KIRC website updated to include biosecurity
4	Vessel Registration Form (1) updated to include compliance	100%	Updated Registration Form in December 2015.

	Task/Deliverable	Percent Progress	Status
5	Cargo Inspection SOP (1) for KIRC	100%	SOP currently in use.
6	Kihei boat house property (8.2 acres) surveyed and controlled for priority IAS	100%	Ongoing throughout grant period.
7	200 acres surveyed for fountain grass, khaki weed and other IAS on Kahoʻolawe	100%	Ongoing throughout grant period. 486 CENSET and 5 ALTPUN controlled on Kahoʻolawe.
8	4 complete CAPS surveys for early detection of LFA at Kihei site	100%	Survey's complete and ant control SOP in place
9	Rodent control and bait stations maintained at Kihei boat house	100%	Ongoing throughout grant period.
10	Newsletter article (1) on Biosecurity and IAS published	100%	KIRC Summer Newsletter. KIRC website includes link to Biosecurity project

Table 1. Progress summary of HISC deliverables.

Deliverable Progress/Tasks Started and/or Completed

1. **Comprehensive Biosecurity Plan Produced (1).**

KIRC submitted the 79 page Kahoʻolawe Island Reserve Biosecurity Implementation Plan to New Zealand Biosecurity Specialist Pete McClelland for review in September 2016. Pete assessed KIRC and PKO operations during a site visit in October 2016 and submitted a review to KIRC with recommendations (Appendix A). These recommendations are also included in the final revision of Biosecurity Implementation Plan available at http://kahoolawe.hawaii.gov/plans/KIRC%20Biosecurity%20Plan.pdf.

The Executive Summary of the Kahoʻolawe Island Reserve Biosecurity Implementation Plan is presented below:

"Annually, Hawaiʻi receives 15 new introductions of non-native (alien) species on average, and certain species are considered "invasive" because they invade and establish populations in new areas. Hawaiʻi's invasive species problem is also the most severe of any State in the U.S. This Biosecurity Implementation Plan for the Kahoʻolawe Island Reserve (KIR) was written for a Hawaii Invasive Species Council (HISC) grant entitled "Biosecurity Implementation Plan for the Island of Kahoʻolawe". A KIR Biosecurity Advisory Committee comprised of personnel from the Kahoʻolawe Island Reserve Commission (KIRC) and Protect Kahoʻolawe Ohana (PKO) guides this document and established protocols and ensures the goal and objectives are met. This Plan has one goal of keeping new Invasive Alien Species (IAS) from entering the KIR and 3 actions using a Prevention and Early Detection/Rapid Response (ED/RR) approach to obtain the goal: Three (3) actions 1.) Prevention, 2.) Detection and 3.) Response are crucial to a successful Biosecurity Plan and preventing new IAS from entering the KIR. Prevention is key and does not allow IAS to enter the

KIR of which Education is an essential component. Detection consists of keen observations and monitoring from KIRC Staff and Volunteers, PKO, and Passenger/Cargo Transport Companies. Response includes Quarantine and Eradication which occurs on site and is an immediate mitigation of IAS with the Rapid Response Kit.

The island of Kahoʻolawe, the smallest of eight Main Hawaiian Islands, is under the jurisdiction of the State of Hawaiʻi and the Kahoʻolawe Island Reserve Commission (KIRC). The KIRC is currently mandated to manage all activities occurring on island including land use and public access, which is only permitted in conjunction with restoration activities and cultural practices of the Native Hawaiian people. The island was a U.S. Navy bombing range between 1941 and 1990 and the island was left littered with thousands of unexploded ordnance (UXO) of almost every type used in warfare at the time. When the Title to the island was returned to the State of Hawaiʻi by the Navy in 1994, the Navy completed a partial clearance of UXO in November 2003 (Parsons-UXB Clearance Project), after which the State gained full control of access to the island. Land Based Biosecurity involves checking all supplies, equipment, personal gear and ceremonial offerings used during cultural practices. These must be carefully inspected before bringing any plant material to island. Baseline botanical surveys have been established on Maui at the Kihei Boathouse property as well as several main ports of entry on Kahoʻolawe. Results of floral and faunal (vertebrate and arthropod) surveys on Maui and Kahoʻolawe are included. Plant nursery protocols for IAS are established as well as methods for control and eradication. Ocean Based Biosecurity protocols outline responsibilities of captains and boaters entering into Zones A and B of the KIR, and lists invasive seaweed species not in the Reserve.

This Biosecurity Plan is intended to identify necessary protocols, vectors and quarantine procedures, and will continue to develop with the assistance of the KIR Advisory Committee, field experts and personnel involved with controlling access into the KIR."

The full plan will be reviewed annually and continue to be updated on the KIRC Website. **Final % of deliverable completed: 100%.**

2. Biosecurity Signage (8) installed at Kihei Boathouse and Kahoʻolawe.

Signage for vegetative quarantine areas developed and installed. Permanent signs relating to Biosecurity, Invasive Algae and Khaki weed installed on KIRC public walking trail near Public Boat ramp (Fig. 3). Final metal signs procured with designated permanent locations to be installed first quarter of 2017 to replace draft signage on Kahoʻolawe and Kihei Property. (Appendix B). **Final % of deliverable completed: 100%.**

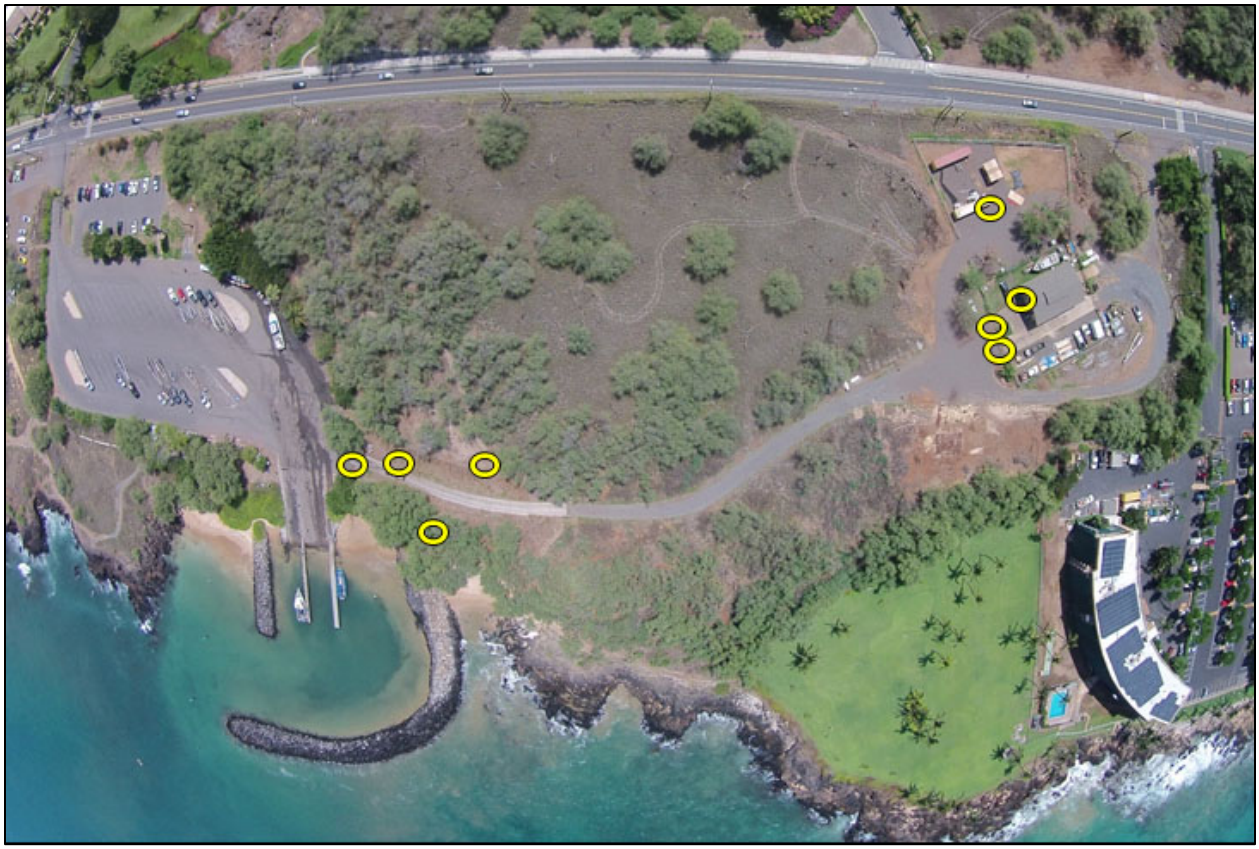


Figure 3. Locations of Biosecurity signage (◎) installed during the grant period. Signage is presented in Appendix B.

3. **Biosecurity information with 2 Standard Operating Procedures (SOP's) added to KIRC website.**

KIRC Website updated to include a Biosecurity Tab on home page available at http://kahoolawe.hawaii.gov/biosecurity.shtml. A PowerPoint presentation is currently in use for training new KIRC Hui Kāpehe Interns and KIRC Volunteer orientation updated with new procedural information. **Final % of deliverable completed: 100%.**

4. **Vessel Registration Form (1) for Open Water Access updated to include biosecurity compliance.**

Completed in November 2015 under condition #7 (Prevention of Invasive Alien Species) and available at http://kahoolawe.hawaii.gov/ocean/ROEPacket2017.pdf. (Appendix C). **Final % of deliverable completed: 100%.**

5. **Cargo inspection SOP (1) for transportation of materials to Kahoʻolawe.**

A cargo inspection SOP (Appendix D) was completed by KIRC staff and is currently in use. IAS interceptions documented in Table 2. **Estimated % of deliverable completed: 100%.**

Table 2. Sample of data collected from Cargo Inspection Forms from Maui to Kahoʻolawe

Log for IAS Inspection Forms						
KIR Biosecurity Implementation Plan						
Entry	Date	Pax	Signed	Comments	Status	Other
1	10-Feb-16	14	GT	Gold Dust Day Gecko	Quarantine	Found aboard `Ōhua in transit during delivery of Ho`okupu
2	22-Mar-16	7	LLA	Quarantined Plants	Fail	Plants left at boathouse/ Crawdads/Soil
3	24-Mar-16	4	LLA	Banana Stumps and Leaves	Pass	Cleaned and Sprayed
4	15-Apr-16	23	LW	Ho`okupu inspected no IAS	Pass	
5	18-Apr-16	8	LW	Beetle found on `Ōhua April 18 2016 - Collected in Vial	Quarantine	

6. Kihei Boathouse property (8.2 acres) surveyed and controlled for priority IAS.

The Kihei property was surveyed for IAS. Pest control and removal is an ongoing effort. During the survey puncture vine (*Tribulus terrestris*) was discovered which never been recorded on Kaho`olawe. TRITER has been added to an ongoing control and eradication effort at the boat house as a priority IAS (Fig. 4). In addition to manually removing seeds and vegetation, a 2% Roundup in water solution is applied to control infestation for both TRITER and ALTPUN. A database and documentation for pesticide use was created and personal protective and safety equipment procured for KIRC Nursery Area (Appendix E). Pesticide has been relocated to designated and secured lockers. A designated mixing and wash-down area was also created along with ED/RR kits. **Final % of deliverable completed: 100%.**

Figure 4. Puncture vine (*Tribulus terrestris*) seeds attached to workers shoes after treating infested area.

7. 200 acres surveyed for fountain grass, khaki weed and other IAS on Kahoʻolawe.

For this project, several locales were designated for botanical and IAS surveys. The main ports of entry for Kaho`olawe are Honokanai`a, KIRC base camp and helicopter landing zone (LZ), Hakioawa (PKO Base camp and LZ), LZ Quail at mid elevation on the island and LZ One at the summit of the island. Currently helicopters are rarely used on Kaho`olawe but during the extensive UXO clearance project the LZ's were heavily utilized and currently these LZ's are to be maintained for emergency purposes (Fig. 5). It was determined these ports of entry were the most likely locations for IAS introductions on Kaho`olawe. An updated species list was compiled for both Kahoʻolawe and the Kihei Property and is included in the comprehensive Kahoʻolawe Island Reserve Biosecurity Implementation Plan. New locations of the priority target species Khaki weed were discovered at the Honokanaiʻa base camp area with 5 individuals treated.

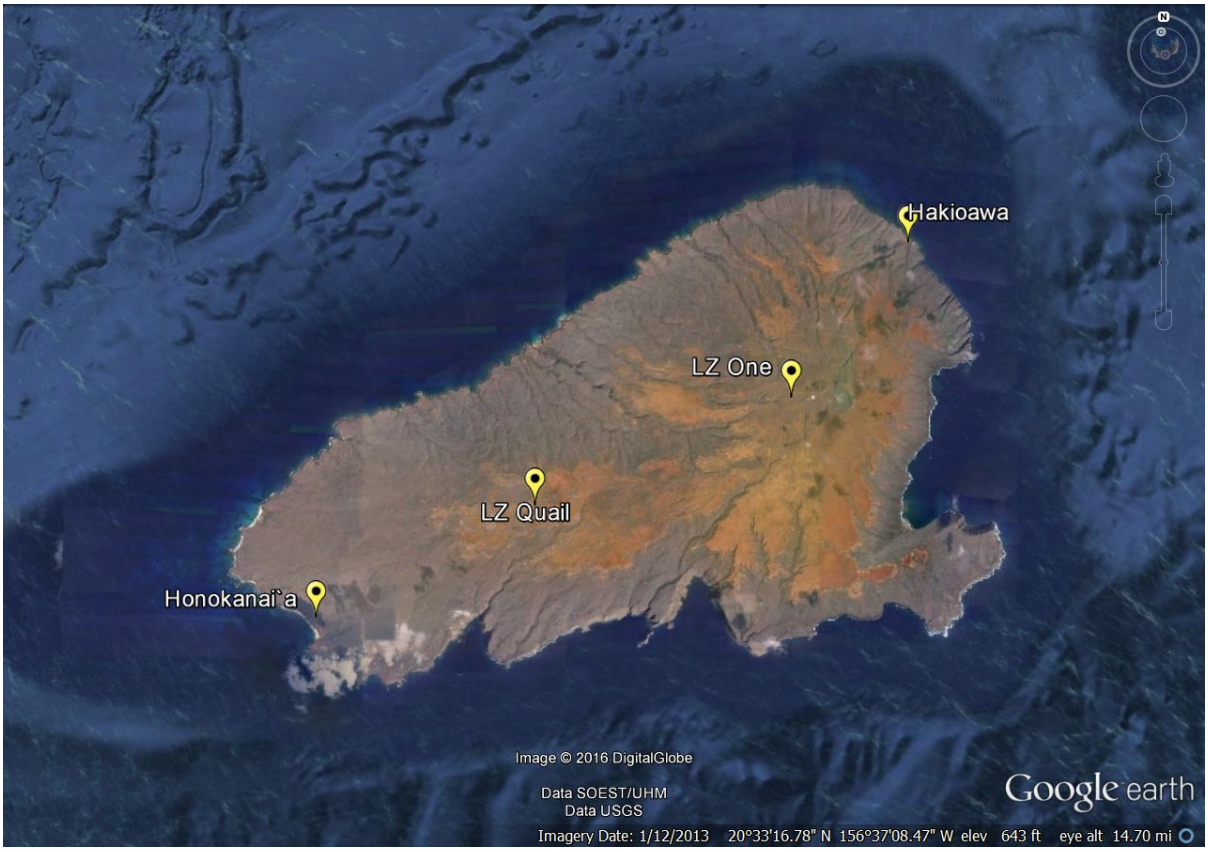


Figure 5. Locations of port of entry botanical and IAS surveys

This project provided the opportunity to expand the fountain grass survey area and a new large infestation was discovered in a location southwest of the known site at Lua ʻo Kealialalo. The new location is in a tier one clearance level designating that the subsurface has not been cleared of UXO. In the subsurface cleared areas, seed heads were removed and bagged up and the plants were dug up with pick and shovel. In tier one areas digging is not permitted; seed heads were removed for disposal and the vegetative clumps were treated with herbicide. The Maui Invasive Species Committee (MISC) were contacted on Best Management Practices and

assisted with control and mapping. Surveys will continue after the typical winter rain events. Through this project, 486 total plants have been located and controlled by either digging up or treated with herbicide and 209 acres have been surveyed using 568 KIRC volunteer hours. Spatial data has been shared and submitted to MISC (Fig. 6).

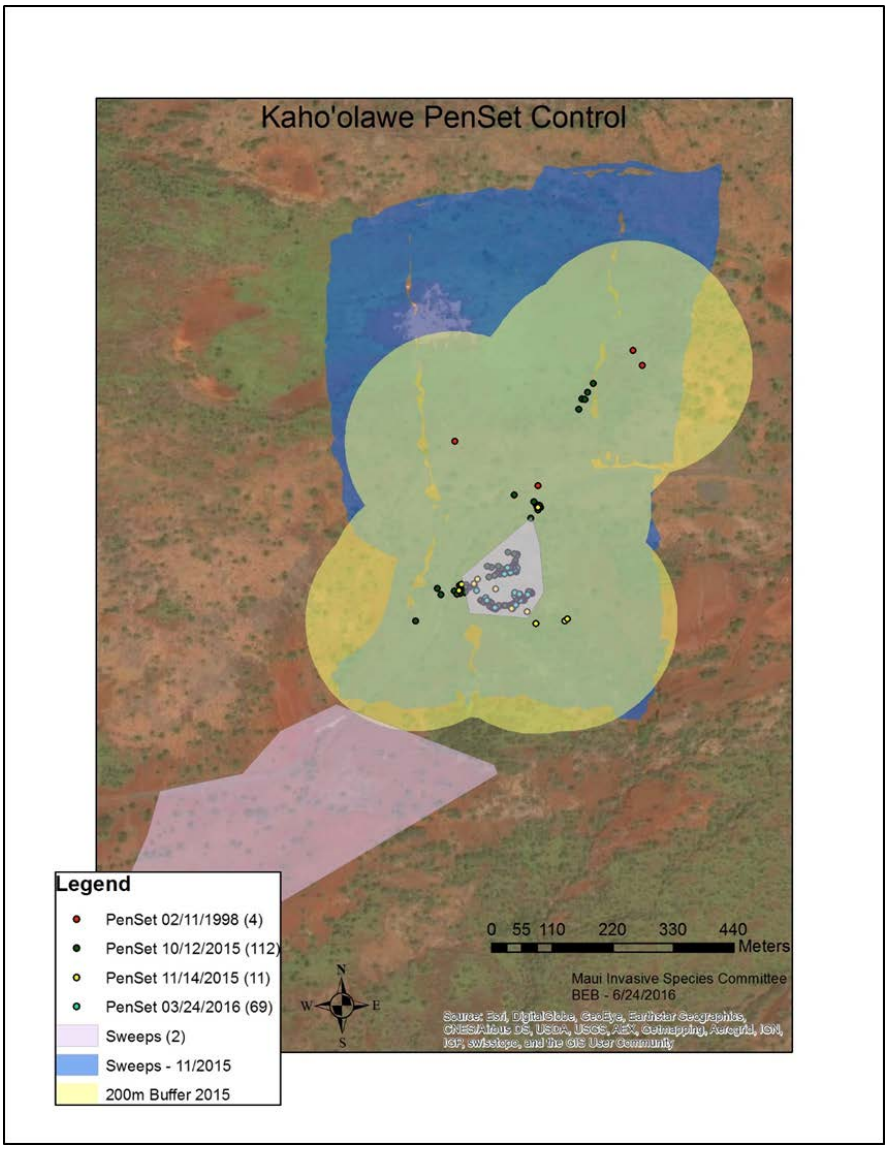


Figure 6. Map generated from Maui Invasive Species Committee using data related to this grant project.

Final % of deliverable completed: 100%.

8. **Four (4) complete CAPS surveys for the early detection of LFA conducted at the Kihei Boathouse.**

The quarterly Co-operative Agricultural Pest Survey (CAPS) was adopted for use in January 2016 (http://www.littlefireants.com/training%20manual%20v2.pdf) and quarterly surveys were completed in December 2016 (Fig 7). Ant species are listed in Table 3. In addition to surveys a

SOP for the boathouse property was adopted for use following recommendations from http://www.littlefireants.com/Management%20of%20pest%20ants%20in%20nurseries%20manual%20draft.pdf and http://www.littlefireants.com/lfa%20fact%20sheet%202.pdf. Career development training of the KIRC Hui Kāpehe Interns included assisting with these surveys and control efforts (Fig. 8). **Final % of deliverable completed: 100%**.

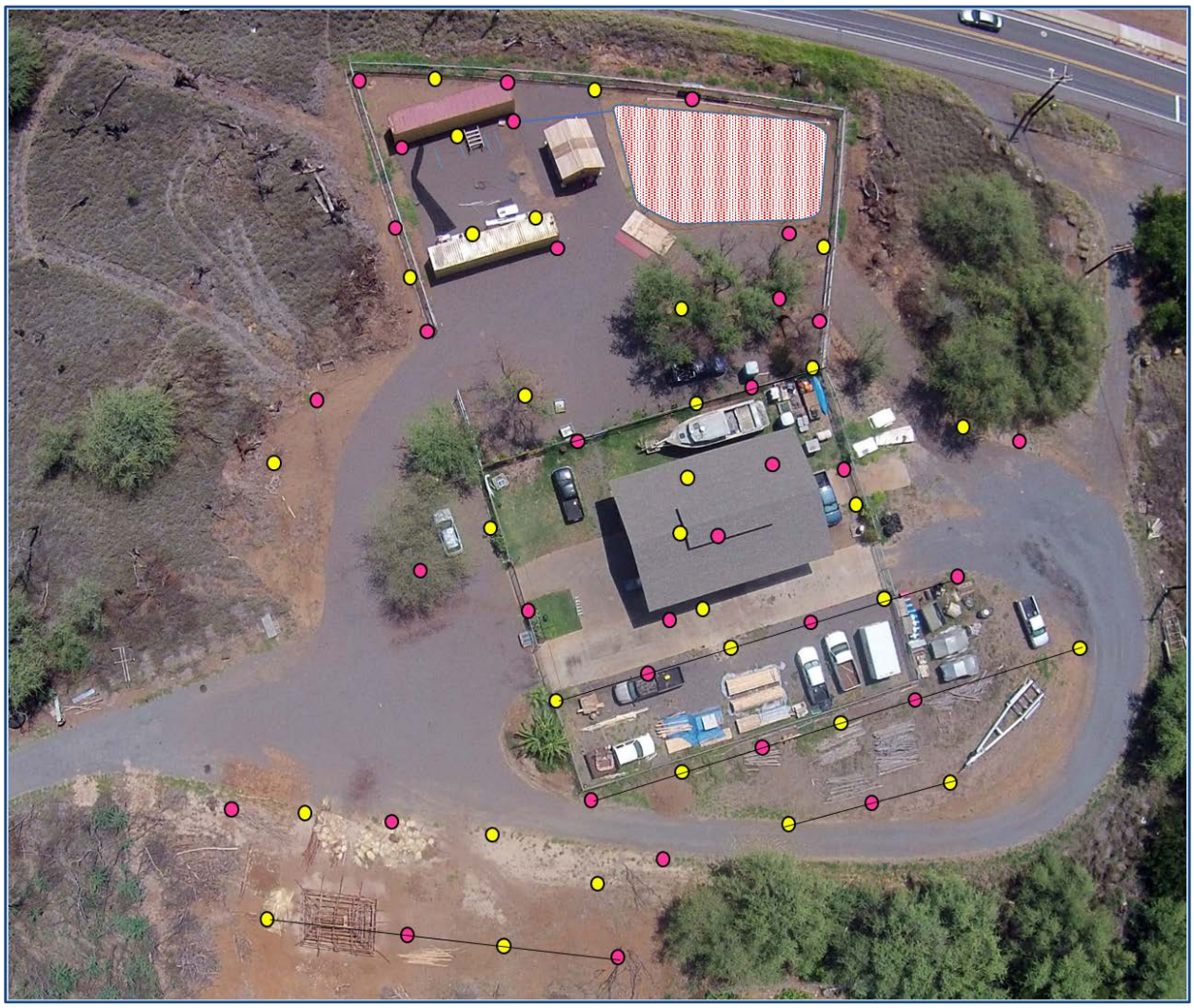


Figure 7. Co-operative Agricultural Pest Survey (CAPS) stations (Protein ● & Sweet ● Baits) and Puncture Vine Quarantine area ▨. Surveys conducted in January, June September and December 2016 utilizing Hui Kāpehe Interns.

Kihei Boat House	Common name	Present on Kaho`olawe?	Risk Assessment Rank from PIA Key
Ochetellus glaber	Black House Ant	Yes	Low
Paratrechina longicornis	Black Crazy Ant	Yes	High
Monomorium bicolor		Yes	NA
Monomorium bicolor (destructor)	Singapore Ant	Yes	Medium
Tetramorium simillimum	Groove Headed Ant	Yes	Medium
Brachymyrmex obscurior	**Dark Rover Ant**	Not recorded in surveys	NA
Cardiocondyla obscurior	**Tramp Ants**	Not recorded in surveys	Low
Anoplolepis gracilipes	Yellow Crazy Ant	Yes	Medium
Pheidole megacephala	Big Headed Ant	Yes	Medium

Table 3. List of ant species recorded from quarterly surveys at the Kihei Boat House Property.

Figure 8. Kihei Boat House and Nursery Ant Management. Monthly Barrier Treatment. Quarterly Bait treatment.

9. Rodent control bait stations (15) maintained at Kihei Boathouse.

To adequately cover the Kihei Boathouse property seventeen stations were deployed. (Fig. 9). All stations have been labeled and serviced on a regular schedule, documented with the rodenticide use log (Appendix F). No rats have been seen at the site for the project period and

bait take continues to be low but mongoose have been sighted on the property. **Final % of deliverable completed: 100%.**

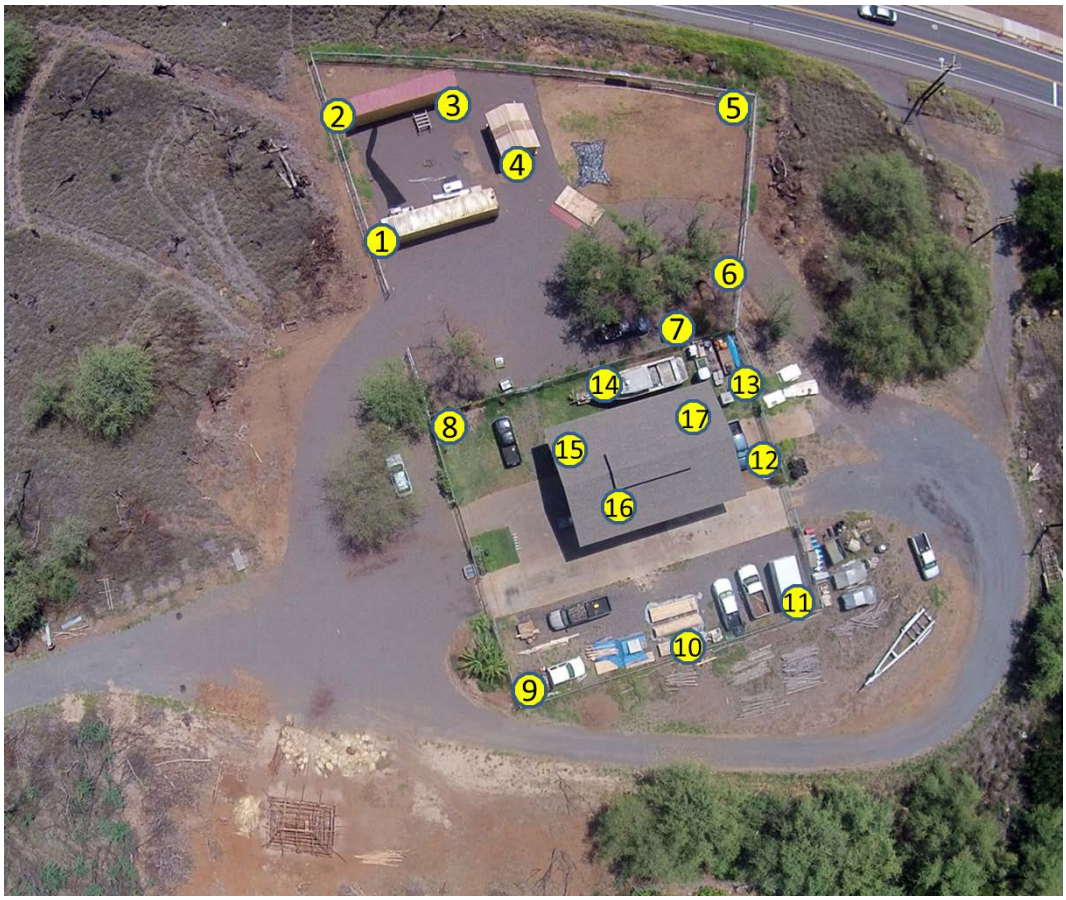


Figure 9. Map of numbered rodent bait stations at Kihei Boat House and Nursery.

10. Newsletter article (1) on Biosecurity and IAS published.

Biosecurity article was published in the July 2016 KIRC Newsletter on Page 6 and is available at http://kahoolawe.hawaii.gov/newsletters/Newsletter%20July_2016.pdf. Additional Education and Outreach is included on the KIRC Biosecurity Project Page. **Final % of deliverable completed: 100%.**

The KIRC would like to thank the Hawai'i Invasive Species Council for this Grant opportunity. The KIRC also sends it gratitude to Island Conservation, National Fish and Wildlife Foundation, Maui Invasive Species Committee and Starr Environmental for project assistance and support.

Kaho'olawe Biosecurity Procedures Review

Prepared for Island Conservation and the Kaho'olawe Island Reserve Commission

By Pete McClelland (Pete McClelland Environmental Services)

Background

Kahoʻolawe Island is located about six miles (9.7 km) southwest of Maui. It is 11 mi (18 km) long by 7 mi (11 km) wide, with a total land area of 44.97 sq. mi (116.47 km^2). The highest point on Kahoʻolawe is the crater of Lua Makika at the summit of Puʻu Moaulanui, which is about 1,477 feet (450 m) above sea level. Kahoʻolawe is relatively dry (average annual rainfall is less than 26 in or 65 cm) because the island's low elevation fails to generate much rain from the northeastern trade winds and Kahoolawe is located in the rain shadow of eastern Maui's 10,023 ft. (3,055 m) high volcano, Haleakala. More than one quarter of Kahoʻolawe has been eroded down to bare soil hardpan largely due to devegetation by cattle, sheep and goats which have since been removed.

Following the return of the Island to the State of Hawaii in 1992 the Kaho'olawe Island Reserve Commission (KIRC) was established to manage the island including: the protection of cultural values; the removal of invasive species; revegetation and biosecurity. KIRC operates a large field base on the south side of the Island at Honokanaia which has a significant amount of infrastructure e.g. buildings, vehicles, etc., and is usually serviced using the KIRC vessel ʻOhua which is effectively a landing craft. This vessel design allows for the easy transport of bulk equipment and supplies direct to the island. A major refurbishment of the base, including the installation of a solar power system, is planned for 2016/17 which will involve the transport of a large amount of equipment, supplies and additional personnel.

The only introduced mammals now present on the island are cats (*Felis catus*), Pacific rats (*Rattus exulans*) and Mice (*Mus musculus*), however there are also a wide range of invasive plants, invertebrates and reptiles on the island.

Where it is feasible and affordable it is proposed to eradicate some of the invasive alien species (IAS), both plants and animals, present on Kaho'olawe. However eradication is not practical or even possible for many species. The high cost of undertaking most eradications and impracticality of eradicating many species once they are established, along with the impact that new species may have on ecological and cultural values makes it important to ensure that additional IAS do not invade the island or that any species which is able to be eradicated does not re-establish on the island. This requires an appropriate standard of biosecurity to prevent reinvasions.

In the case of the proposed eradication of rodents it is important that the required standard of biosecurity, i.e. preventing any rodent invasions, is put in place well in advance of the eradication so that the systems and processes can be reviewed and audited. The investment in a rodent eradication is significant and one of the requirements for an eradication (Cromarty et al 2001) is that reinvasion can be managed to near zero. As Kaho'olawe is outside the

swimming range for rodents any reintroduction will be human assisted, hence the need for a comprehensive biosecurity system to protect the eradication investment and to prevent the establishment of additional rodent species which will have cumulative, and likely greater, impacts than those already present.

KIRC developed a draft biosecurity plan for the island and requested an external review of that plan to confirm that it was fit for purpose. This review was undertaken with assistance of Mele Khalsa from Island Conservation who coordinated the visit. Island Conservation are working with KIRC on preparing for the eradication of rodents and cats from the island.

There are three major components of an effective biosecurity plan:

- Prevention- stopping the IAS before it gets to the island
- Detection- locating and identifying it if it gets there
- Response- removing it quickly before it can establish and becomes impossible to remove or at least increasingly expensive to do so.

Due to the issues with locating, identifying and eradicating IAS once they are on an island (including cost and feasibility of removal), the emphasis of the plan/focus of resources should be on preventing IAS getting to the island rather than trying to detect and eradicate them once they are present. Prevention is the most operationally efficient and cost effective way to prevent IAS establishing, especially for rodents, invertebrates and reptiles. Unlike plants which are often readily observed and identifiable, and there is time to remove them before they reproduce, animals are often cryptic, hard to detect, relatively mobile and have the reproductive ability to reach unmanageable levels before they are detected.

While many biosecurity plans include the detection and removal of self-introduced species, e.g. rodents which may swim to the island, the Kaho'olawe plan deliberately does not consider those plant and animal species which are likely to self-introduce as the dominant wind direction and major seed/population source on Maui means that managing this pathway is impractical.

It is important to note that each species brings with it different and often cumulative impacts for example while there are rats on the island it is just the Pacific rat, (*Ratus exulans*) if any of the European rats got established they would be likely to have a much greater impact as ship rats (*Rattus rattus*) are much better climbers so are more likely to affect tree nesting birds, while Norway rats (*Rattus norvegicus*) are much larger and can have a greater impact on ground nesting birds. Also, the seeds of many plants are difficult to differentiate so while most seeds on a boat (as observed during the KIRC access) may be of a species already present on Kaho'olawe there is a risk that in with them will be a highly invasive species. As such it is important to aim to stop ALL unplanned transfers of species to the island rather than try and differentiate between species.

A crucial partner in implementing any effective biosecurity for Kaho'olawe is Protect Kaho'olawe Ohana (PKO) an independent group working to re-establish the native Hawaiian cultural link with the Island. They have a base on the north side of the island at Hakioawa and undertake regular visits to the Island for cultural purposes including using volunteer groups to undertake a work programme.

Information collection

Between 10 – 12 October 2016

The author and Mele Khalsa met with Paul Higashino and Jamie Bruch, Lopaka White and Grant Thompson – Captains for the ‘Ohua, and Bart Maybee who works at boathouse/nursery to discuss biosecurity, both current and what is practical for the future. They also visited the KIRC field operations base/boathouse at Kihei on Maui to inspect the boat house, the KIRC boat, the ‘Ohua, and the nursery and the area around the boat ramp and observe preparations for an access.

The author and Mele accompanied Lopaka to the Kahului Heliport where most of the helicopter loads for Kaho’olawe are prepared. They then observed an aerial transfer of bulk equipment using an underslung cargo net from the site at Pu’unene – which is apparently the primary site for hooking up underslung loads as it is much closer to the Island than the Heliport.

On October 12th the author observed a KIRC access/landing to Honokanaia using the NOAA vessel Koholā which was stored at the KIRC boat house at the time. This vessel was staffed by NOAA personnel with KIRC staff as support. It was not a standard access/landing as it was without the ‘Ohua which is effectively a landing craft and pulls up on to the beach and lowers a bow ramp so that ATVs can drive ashore with gear and supplies in in large totes/fish containers on the back. For the observed landing the limited amount of gear and supplies was ferried ashore in an inflatable dingy. The procedures surrounding a “standard” access was discussed with different staff members and the organisation for such an access observed e.g. use of totes, ATVs etc.

On October 13th the author accompanied Lopaka on a PKO volunteer group access to the island. This included visiting the warehouse where the group pack their supplies the day before, visiting the Hawaiian Canoe Club base where the party stay the night prior to their access. After participating in the access, which included floating gear ashore and setting up camp, Lopaka and the author travelled across the island to the KIRC base visiting a range of sites on the way guided by Jamie. The group overnighted at the base before departing on the NOAA vessel on the 14th.

A verbal briefing on the observations and general recommendations was made to Mike Naho’opi’i the KIRC CEO. Mike was especially keen to know what actions could be taken in the short term to improve biosecurity as the main “Makahiki” (cultural landing season) of November to February which involves multiple PKO landings as well as KIRC accesses, was starting shortly.

Biosecurity plans - general

In order to be effective, a biosecurity plan must be:

Affordable – the plan must be able to be fully implemented with the available resources – financial and personnel. It is not necessary that all actions stated in the plan occur at one time but any proposed phase-in must be stated in the plan so it can be appropriately audited. The

agency must be able to resource the establishment of the proposed protocols and systems- purchase of equipment, development of educational material, etc.

Sustainable – there needs to be a high likelihood of the required resources for the ongoing implementation of the plan being available. If this is not the case, then the plan should state what is able to be achieved and highlight any facets that will be implemented when/if resources become available in the future. This allows auditing of the procedures that are supposed to be in place at the given time.

Effective – if the biosecurity systems won't make any difference, why do it? It may be appropriate for the plan to only target some higher risk species or specific pathways. Regardless of the standards set are they need to be clearly stated in the plan so that it can be audited and the agreed standards maintained.

Achievable – the planned actions must be logistically as well as financially achievable within the available resources and stated time frames.

Acceptable/Justifiable – as it will entail extra work for visitors, the proposed plan must be acceptable to all users or at least it must be easily explained and justified. If it is too arduous to comply with the requirements of the plan and they don't understand why it is necessary, visitors, including some staff, won't comply and will put their effort into circumventing the processes.

Enforceable – while it highly preferable that the required actions are accepted and supported by all relevant personnel, it is highly likely that some individuals will not fully engage with what is required, or due to time constraints will not make biosecurity the required priority. This means the plan must be able to be audited e.g. random checks on gear, boats etc., and there then needs to be realistic penalty for noncompliance.

Understandable – keep it as simple as possible while still covering all the required detail. It is always possible to upgrade the requirements once biosecurity becomes standard practice/part of the culture of the management of the island. If a plan aims too high i.e. personnel think it is impractical or too arduous to comply with or they simply don't understand what is required of them they won't follow it and it becomes worthless.

Supported – it is crucial that biosecurity has support and priority at all levels within the Commission but especially at the management level. If staff feel like they have management's support, they will be more inclined to step up and make any hard decisions necessary to maintain the set standards for biosecurity even if it is inconvenient or at a financial cost. If staff feel that the set biosecurity standards aren't supported by management they will be more inclined to do what is easiest/cheapest possibly at the expense of biosecurity. As an example, in order to maintain the set biosecurity standards, it is quite possible that an access would need to be postponed or at least containers of equipment and supply not taken to the island delaying work programmes. This has an operational/financial cost but all personnel must see that cost as secondary to maintaining the standards.

Improving the Kaho'olawe biosecurity plan

While providing a great deal of background information that will assist with the various aspects of biosecurity, the current version of the biosecurity plan for Kaho'olawe does not record what is actually happening in the field regarding the biosecurity processes currently undertaken by KIRC staff and the PKO. This lack of information on what biosecurity actions are currently being carried out gives the impression that little if any attention is given to this important aspect of the island's management. During the site visit it was found that this was not the case and that there is currently a good level of biosecurity in place – both direct and as a by-product of other requirements e.g. logistical constraints for both KIRC and PKO accesses. Even with the good level of biosecurity currently in place, there are still opportunities to make significant improvements. KIRC field staff are very aware of the impacts of IAS and consequently the importance of biosecurity to protect the island from additional IAS while the PKO personnel spoken to were very open to any suggestions to help protect the island and to working to implement any appropriate requirements.

As stated above the first and most important step in improving biosecurity for Kaho'olawe is to document what actions are currently taking place. Documenting what is currently being done allows these processes to be standardised as far as possible, allowing for logistical differences between groups, across all visitors/accesses and reviewed both formally and informally to look for possible improvements as new opportunities/technology/resources are identified. It also allows for ongoing audits of the processes to ensure that the agreed standards are being followed.

If resources allow, all reasonable pathways should be covered by the plan i.e. it is not possible to stop wind born organisms, so emphasis should go on those pathways that can be managed. It is also important that all pathways are considered equally, but not necessarily given the same priority for resources if the risks (risk = likelihood x impact) differ between them. It is important that all visitors are treated equally so that no group feels like they are being singled out. This is particularly true for the relationship between PKO and KIRC. KIRC has to be seen to be leading by example not simply telling others what to do while not following the same rules. Ensuring everyone is treated equally is one important reason for having a written plan so that what KIRC is doing can be readily shown to all parties (including partners and funders).

The comments provided are based on the understanding that the ability to enforce strict biosecurity i.e. comprehensive inspection of all equipment and supplies is limited, so improving biosecurity requires education and acceptance from all the visitors.

It is important that a specified position is made responsible/accountable for undertaking the required actions as otherwise it is too easy for the assumption to be made that someone else is doing it.

It is also important to develop a culture of collective responsibility and empowerment for biosecurity i.e. everyone is looking for any risks and ways to eliminate/minimise them. This has to be everybody's duty, as the staff member designated as the Biosecurity Officer will not be present for all stages of loading and unloading or even every access. Therefore everyone involved needs to be monitoring for and identifying/reducing risks and feel able to raise any issues they see knowing they will be properly considered.

Six different methods for undertaking an access were identified:

KIRC access via ‘Ohua

KIRC access via a different boat- NOOA vessel / Charter vessels.

PKO access via charter vessels

Helicopter access including supply

Other vessels/ groups including canoe club.

One off major accesses – for construction etc, involving a large amount of equipment and supplies and a larger vessel.

It is likely that each access method will need a separate “sub plan” although that may be only a couple of pages dealing with that specific situation. Most people only want to know how the plan affects them and what they have to do, hence the suggestion of very focused sub plans.

The KIRC staff spoken to are very aware of biosecurity and are keen to do what they need to to protect the Island. There is already a high standard of biosecurity built in to the normal operations of servicing the Island but most of these are not recorded anywhere and certainly not in one place, which leads to a risk of inconsistency especially at times of staff changeover and also an inability to audit and review the processes. A plan is also important to be able to demonstrate both internally and externally what is being done. This is especially important for the relationship with PKO and others where KIRC has to be seen as leading by example.

PKO are probably the most important partner with KIRC for biosecurity. The logistics and procedures undertaken by PKO personnel leading up to and during an access generally give a good level of biosecurity i.e. packaging all food etc. in plastic bags shortly after purchase; most bags being washed in seawater as they go ashore; however, the transport of plant material does pose a significant risk which must be managed, refer below.

Actions

- Include all current biosecurity practices in the biosecurity plan.
- Audit on the ground practices against the plan- alter the practices and/or plan so that they are consistent.

The proposed approach is to build on and improve what is already in place without incurring significant expense and inconvenience (e.g. setting up a full quarantine store with a biosecurity officer). As the plan is dealing with humans no one step or process is foolproof it is better to have multilayered systems where if one step is forgotten or fails other steps will hopefully provide the required level of protection.

Recommendations for improved biosecurity

Helicopter operations.

While the set up in the helicopter hangar could be modified to improve biosecurity e.g. decrease the amount of gear on the floor to remove refugia, and install rodent stations/trap (these may have been present but weren't observed), it was found to generally be in a good condition for a busy work area. Cargo nets were checked and appeared to be free of contaminants – seeds, inverts, etc.

The observed helicopter operation consisted of the helicopter lifting a load of equipment in a cargo net from the back of a small truck. If this is the standard procedure then it provides a good level of biosecurity, assuming the net is inspected beforehand, the deck of the truck is cleaned and checked and the equipment itself is checked.

The risk would be far greater if the net was lifted directly off the ground, as when the net closes up it can easily pick up vegetative material including seeds, it can also provide the opportunity for invertebrates etc. to get on board. If loads are to be picked up off the ground it should only occur at sites clear of vegetation.

If the helicopter is to land on Kaho'olawe the skids should be checked for plant material and the inside of the helicopter checked/cleaned.

The Boathouse

The KIRC staff at the boathouse have already identified most of the more straightforward improvements that can be made and are working to implement these; however, it is still important to document these suggestions/proposals so that there can be a formal follow up to ensure they have been considered and if appropriate actioned.

The Facility

- Remove or at least tidy up the clutter outside the boathouse, particularly at the back, as it provides major refugia for rodents.
- Tidy up inside the inside of the boathouse, appreciating that this is restricted by the limited space available. A tidy up includes getting everything possible up off the floor, i.e. on shelves preferably at least 6in above the floor to reduce available refugia for rodents, geckos and invertebrates. Many animals, including rodents, follow along walls when moving around so keeping the floor clear enhances the animals innate desire to avoid open spaces and therefore travel around the walls where they can be more easily targeted using traps, toxicants and/or glue boards.
- Consider painting the floor of the boatshed white/light grey to facilitate locating invasive animals e.g. a line of ants or any rodent or insect is much easier to see on a white floor than dark concrete. Also, many animals are less likely to go on a bright surface where they are easily seen.
- Review the number and location of bait stations. There are currently rodent bait stations outside the boat shed which are shown on a map held in the bait shed and are serviced by Jamie. Each station should be clearly individually numbered so that anyone can locate them (i.e. have a number not only on the station but also have a tag

above the station) with the resulting map, along with a service schedule and accountable position (for making the sure the servicing schedule is followed) included in the biosecurity plan so that it can be audited and modified if required.
- If a suitable lure/bait can be identified, i.e. one that will last in the presence of ants etc., consider using rodent traps as well as bait stations both inside and outside the buildings with details of all captures recorded. While they are more work as they need to be checked/rebaited more frequently the inclusion of traps as well as bait stations will allow a risk profile of species, locations, times of year etc. to be built up so that the plan can be better focused to make the best use of available resources.
- Remove any invasive plants which are not present on Kaho'olawe from around the boathouse in order to reduce the risk of transporting seeds.
- Remove invasive trees from the boat storage area which may drop seeds into boats. While these trees may be present on Kaho'olawe the presence of "okay" seeds makes the detection of unwanted ones much more problematic.

Cargo management

- If the boatshed can be tidied sufficiently and there is sufficient room, mark an area (painted square) away from the walls in which all totes are to be loaded. This is to keep the totes as far from the walls as possible as most IAS are less inclined to move across open ground.
- Ensure that the lids are placed on the white bulk totes whenever they are not attended i.e. being loaded.
- Only fill the totes as close to the access as possible, e.g. the day before, and make sure that every container (boxes and bags) are thoroughly inspected before being loaded into the totes.
- Minimise the time between equipment and supplies arriving at the boathouse and them going to the island to reduce the opportunity for IAS to access containers, e.g. get into cardboard boxes.
- Place a glue trap/bug killer in each tote if they are to be left overnight in the boathouse and when they are closed ready for loading. The glue board can be checked prior to loading/unloading to see if ants are present.
- Consider loading the totes onto the Ohua as soon as they are filled full as this is likely to present a lower risk than storing them in the boat house i.e. less chance of IAS being present on the boat than in the boat house as the boat is fully washed down after each access. If feasible also wash the boat down the day before each access.
- Consider using a student (at a higher level e.g. late secondary or tertiary) to review the biosecurity risk e.g. to undertake random inspections of "loaded totes", boxes and bags etc. as well as the presence of IAS around the boathouse in order to help quantify the risk associated with different pathways so that the available resources can be best utilised.

Use of boats

- All vessels should be thoroughly visually inspected prior to loading, including checking of glue boards, traps etc. (refer below). This would be undertaken by the

skipper for the ‘Ohua and the trip lead for other boats. If seeds etc. are found the boat should be washed down and rechecked.

- Put bait stations, traps, glue boards on board at least the night before departure to detect the possible presence of IAS, especially ants and rodents. These should be checked by the captain/trip lead prior to commencing loading and prior to departure.
- For trips on the ‘Ohua make the captain responsible for biosecurity for consistency purposes. While other personnel may vary, there is always one of the two approved captains present (and the 2 current captains have a really good attitude to biosecurity). For accesses using other vessels make the trip lead responsible/accountable. This role needs to be clearly set during the planning stages of the access so that everyone knows who it is.

Transportation of plants/vegetation

PKO landings present one of the greatest biosecurity risks identified, namely the transport of plant material including banana stumps to the island for ceremonial purposes. The taking of vegetation to the island has a high potential to transport everything from seeds and invertebrates to geckos and even mice. It is important to come up with an environmentally and culturally acceptable, and preferably easily implemented, process that will reduce this risk to an acceptable level. This should include a comprehensive visual inspection and possibly immersion in salt water or treatment with a suitable insecticide e.g. pyrethroids which is readily available.

Rooted plants in soil also present a major risk both for invertebrates and pathogens, especially as they can come from anywhere in the archipelago. As such as it is important to find an acceptable way to manage this risk e.g. insist that plants are from an approved nursery or, as suggested by KIRC field staff, have visitors repot all plants with approved potting mix at the boathouse prior to their going to the island.

KIRC transports thousands of trees to Kaho’olawe which come from specific nurseries, (note this process was not able to be observed) however there appears to be nothing documented as to the biosecurity precautions required by these nurseries. The current practises at the nursery should be written up and confirmed as being appropriate, with appropriate changes made if required and then monitoring/auditing these standards should be a requirement of supplying plants for the Island. If possible an audit system of those standards should be undertaken regularly, e.g. 6 or 12 monthly, preferably by KIRC personnel.

Trees should only be picked up/delivered to the boathouse as close to the access as possible i.e. the day before, to minimise the risk of IAS getting in to them. All trees should be visually inspected as they are loaded into totes and the totes should be loaded onto the boat as soon as possible once again to minimise the risk of IAS accessing them.

Personnel/personal gear

Currently a weak link in biosecurity for all groups is personal gear = both staff and volunteers. Both KIRC and PKO have procedures in place to reduce the risk of IAS via purchased supplies: PKO by bagging all equipment and supplies in plastic bags and KIRC

putting it into large totes; but these procedures do not cover personal gear. While it would be ideal to inspect every visitors gear, such a level of inspection is currently impractical for Kaho'olawe. Therefore, in order to reduce the risk of IAS accessing the Island via the personal gear pathway, it is important to put greater ownership of the issue with the individual. The difficulties/impossibilities of enforcement at the individual gear level requires easily understandable procedures for everybody to follow and letting people know what is required as early as possible, so that biosecurity procedures simply become part of the privilege of accessing Kaho'olawe.

As all accesses require a permit/approval from the KIRC or at least the KIRC is aware of them, it should be possible to ensure that all personnel get the required information; however, the different techniques need to be dealt with separately as the systems, and hence the risks, associated with them and how they are managed are quite different.

One of the best ways to get information to new/irregular visitors early is to have the required biosecurity information along with the other background information on the website although this could be supplemented with hard copies e.g. brochures in case people can't access the website.

The KIRC volunteer information currently has a reasonable level of information on biosecurity although it is given under the "Flora" heading rather than under biosecurity (excerpt below as example):

Flora

Protocol for the Prevention of alien species introduction

Control of introduced plants and animals and restoration of native plants and animals are principal goals of the KIRC to restore Kahoʻolawe. New accidental entries to the island add to an already extensive list of alien species, resource management workers, with increased urgency, call for stricter control measures to prevent alien ingress into natural areas. Every person is a possible vector (transmitter or carrier) of alien species. Taking preventative measures to hinder the introduction of alien invasive species to Kahoʻolawe is crucial to preserving the native environment. These measures include: 1. Inspecting all clothing, gear, and equipment before coming to Kahoʻolawe. Field pests include weed, seeds, and insects. Thoroughly clean footwear, socks, pant legs, jackets, rain gear, tools, packs, and other containers. 2. Thoroughly wash and dry all swim clothes and gear. Dip snorkel and fins in a light bleach solution prior to your Kahoʻolawe access. Invasive algae is just as dangerous as terrestrial weeds. 3. Become acquainted with Hawaiʻi's invasive species, their status, and locales. Learn which are localized to your area and be alert for those established on other islands or natural areas. 4. Keep localized infestations from becoming established on other islands or in other preserves. Avoid spreading pests from your home that your destination may not have, and vice versa, by inspecting and cleaning.

This information should be put under a specific Biosecurity or "Protecting the island" heading and reworded to make it more readable e.g. instead of "prevent alien ingress" = simply have "prevent introducing unwanted/alien species".

Including a specific biosecurity checklist e.g. Appendix 1, which leads a visitor through the steps required for any person preparing to visit the Island in order to minimise the risk of

them introducing IAS. The form should be completed as the person packs their gear then signed and bought with them to the orientation. Having the person actually complete and then sign the form not only reinforces the higher risk parts of their preparation e.g. seeds in socks, Velcro, pockets, tents and in the bottom of their bag, it also gives them accountability for their actions even if no further action e.g. inspection, is taken.

As all volunteers complete the KIRC volunteer registration which obtained online, by attaching the biosecurity form to this all information package all volunteers will receive it.

Experience has shown that while volunteers may not comply with requirements out of lack of understanding of what is required, staff/regular visitors do it out of complacency or inappropriate prioritisation, “it won’t be me, I know what I’m doing”. Having all visitors, regardless of whether they are staff, regular visitors or volunteers, complete the form not only reinforces the priority it shows volunteers that everyone is treated the same and that biosecurity is business as usual and not something that is only done in the case of unusual events or infrequent visitors – this is especially important for PKO with KIRC.

One specific risk relating to PKO access’s that was identified by KIRC staff was the potential to unintentionally transport vegetative material, as opposed to taking cultural material covered previously, along with other IAS, from the site where PKO personnel camp at the Maui canoe club to the island. This includes seeds and animals in tents or in bags. Managing the issue of ensuring all gear is clean is problematic to deal with as the people pack up in the dark when the risk of collecting IAS is greatest, but reinforcing to everyone the need to clean and inspect all gear is an important first step. KIRC staff have already identified the option of removing high risk plant species form the site to reduce the risk of transferring them to Kaho’olawe.

Orientation briefing

Providing targeted biosecurity information before the trip as above, can then be reinforced with increased emphasis on biosecurity at the orientation meeting. Noting that while this is important for the more reactive actions of biosecurity e.g. being vigilant during travel and on island, it is likely to already be too late for any IAS which may be inside their bags.

With regard to biosecurity the briefing should be simple and focus on what the visitors can do to help protect the island from IAS, The briefing requires a certain amount of biosecurity background but should be kept as simple and to the point as possible.

For any briefing using PowerPoint select photos that are appropriate i.e. show the unpleasant side of the target creatures. Cute pictures of mice and rats or attractive flowers will not motivate people to carry out the desired actions to prevent IAS making it to the island. There are a good range of suitable photos available or simply use a readily identifiable silhouette.

One-off operations

It is currently planned to undertake a major refurbishment at the KIRC base at Honokanaia including the establishment of a major solar power system. This project will involve transporting a large amount of equipment and supplies to the island. As the standard biosecurity plan is unlikely to be able to effectively manage this situation it is suggested that a specific biosecurity plan be completed for these “one-off events”. The plan should be drafted before the contract is let in order to include any relevant requirements, such as

cleaning of gear, inspections etc. in the tender documents/contract and should then be completed in conjunction with the contractor to ensure it is practical and achievable.

One-off plans focused tightly on the targeted operation should be completed for any future operations which are "nonstandard" i.e. go outside the scope of the Island's biosecurity plan.

Detection

As it is not possible at this point to implement biosecurity standards which will reduce the likelihood of transporting seeds to the island to the desired level, at least not for personal gear which would require a comprehensive inspection of all gear (KIRC and PKO personnel) prior to departure, it is suggested that regular/annual checks of the main access sites, Hakioawa and Honokanaia, by a good field botanist, entomologist and possibly herpetologist should be undertaken/continued to try and detect any new species before they have the opportunity to spread. Removal of any new species should be made a priority.

While work to date indicates that any newly arrived rats are likely to cover quite a bit of the Island before settling down, when they do settle down it is likely to be in the vicinity of human habitation providing shelter and food. As such it is suggested that bait stations or preferably traps (so that any detection can be recorded which is often not possible with toxic bait) are set and maintained around the buildings at the 2 landing sites. As with the bait station these should be numbered and the details of the locations and service schedule and position responsible for them being recorded should be included in the biosecurity plan. Thought needs to be given to the trap type as some (e.g. Goodnature A24 self resetting traps) while operationally useful as they require minimal servicing, need the trigger counter attached to record if they have been activated and then still don't give a body for examination of species, sex, breeding status etc. Work of this nature is a lower priority than the pretrip prevention.

Response

While removing of recent plant incursions may be possible if they are detected early enough the options for response to many animal incursions are very limited. Animals, especially more mobile ones, are problematic as it is often a case of trying to delineate the extent of the incursion which takes time, by which time the animals have already spread further. However, there is a social and political expectation that when an incursion occurs, there will be a response/eradication. As such it is important to be ready either by having a supply of response equipment, e.g. detection devices, traps etc. for animals and sprays and spray gear for plants on site or as access to Kaho'olawe is relatively easy it can be to have a list of suitable suppliers with contact details listed in the biosecurity plan so that the gear can be obtained quickly.

Management support

A crucial and often understated element of successful biosecurity is management support. The best intentions of field staff and detailed biosecurity plans are of limited use if they aren't appropriately resourced and implemented. Biosecurity does come at a cost, particularly staff time, which is usually understated and all too easily reprioritised to undertake more obvious short term tasks. Biosecurity often does not have a quantifiable return as its main goal is to stop a problem before it starts. It is not possible to know how many interceptions there will be

or what species they will be, In the case of preventive measures including self-checking of gear KIRC will not even know when or if an interception has occurred. All too often good biosecurity systems are developed but then managers redirect resources which leads to failure.

An example of where management support for biosecurity is crucial is if an unacceptable risk (the definition of unacceptable will differ between individuals) is identified immediately prior to or even during the trip to the Island. The boat captain has to have the ability to postpone the access until the risk has been managed/negated. Such a delay can be a major inconvenience and will incur a financial/opportunity cost. If management support the action, assuming it is reasonable, which should be agreed in advance, it reinforces good practice whereas if they complain about the access being postponed the staff will take that lead and not respond adequately to future risks.

It is apparent that there is currently a high level of support for biosecurity at all levels in KIRC including top management. This support makes it much easier to institutionalise good behaviours and simply make biosecurity part of the organisational culture.

Summary

While biosecurity can always be improved, the existing processes observed during the field visit and as explained by KIRC staff are to a high standard. They are practical, achievable and are already part of the day to day operations. What they are largely lacking is documentation.

In order to maximise consistency both among existing staff and into the future, all biosecurity procedures must be written down in a readily accessible format. This not only shows that appropriate procedures are in place, it allows them to be audited, reviewed and revised as necessary e.g. as new techniques or new logistics issues come along.

The plan must be reviewed on a regular basis – suggested after 1 year then 5 yearly after that or it can be sooner if things change e.g. resourcing, specific risks or an issue is identified. A gate keeper to the plan needs to be identified with the authority to modify the plan as required although any such changes should be discussed with/explained to all relevant staff to maximise buy in.

Thanks to Mele Khalsa for organising the logistics for the visit and reviewing this manuscript, to all the KIRC staff, especially Jamie Bruch, Lopaka White and Grant Thompson, for their time in explaining the KIRC operations and current biosecurity practises. To the PKO team for allowing us to accompany their access to get an understanding of their operation.

Appendix A

Appendix 1 Quarantine self check list

Kaho'olawe Quarantine Self Audit Check Sheet One quarantine form to be completed by every person traveling to island. Please bring this form with you.			
Date:			Date inspected:
Name:			Destination:
Prior to arrival for quarantine check at ?? all clothing and equipment must have been recently washed, dried and cleaned of any seeds, organic material and insects. Footwear must have been scrubbed clean in a weak bleach solution. Any unclean items will not be permitted onto the island. Pay particular attention to any Velcro, pockets, the inside and pockets of bags for seeds etc.			
	Tick if in compliance	**Inspected by quarantine officer**	**Comments-**
Boots			
Other footwear			
Socks			
Clothing			
Waterproof leggings			
Parka			
Coat			
Field equipment **Tent** **Sleeping bag**			
Food stores (boxed/bagged)			
Other **Cultural materials**			
SIGNED: visitor			**SIGNED: Quarantine Officer**

Appendix B

KAHO'OLAWE ISLAND RESERVE

BIOSECURITY AREA

PREVENTION ►► DETECTION ►► QUARANTINE ►► ERADICATION ►► EDUCATION

The Hawaiian archipelago accounts for only 0.2% of the U.S. land area but is home to nearly 75% of recorded extinctions, with invasive alien species (IAS) as the leading cause.

The KIRC prioritizes an IAS-free Kaho'olawe Island Reserve for the benefit of recovering Native Hawaiian species and revitalizating Native Hawaiian cultural practices. It is the kuleana of every person visiting or working on this property to protect the Reserve from the entry and spread of pests and diseases.

Please notify a member of the KIRC staff immediately if you identify any of the IAS shown on this notice within the vicinity.

KHAKI WEED (Alternanthera pungens), also known as "pokey weed" seeds or burrs are dispersed largely by footwear, clothing, tires and animals.
Please help us keep Kaho'olawe khaki-free: stay alert!

◄◄◄◄◄◄◄

KAHO'OLAWE ISLAND RESERVE COMMISSION

WWW.KAHOOLAWE.HAWAII.GOV

811 KOLU STREET SUITE 201
WAILUKU, HI 96793
808.243.5020

/KircMaui @KircKahoolawe

Appendix B

Help Keep Kahoʻolawe Khaki Free

Painful burs form mats

Check tires and footwear

Bag up the whole plant

Dig out the whole root

Did You Know:

•Kahoʻolawe and Niʻihau are the only Main Hawaiian islands without an established population of Khaki Weed (*Alternanthera pungens*)?

• Also known as "**pokey weed**", most people notice this invasive species when stepping on the sharp-toothed burs barefoot. Seeds are dispersed by footwear, clothing, vehicle tires, and animals.

•Control can be achieved by digging up whole plant the with pick or shovel. Make sure the whole taproot is dug out with seeds bagged up for disposal. Clean seeds from gloves and tools into trash bags.

• **Check and Clean** footwear, field gear and automobile tires before coming to the Kihei boathouse or Kahoʻolawe. Help keep Kahoʻolawe a khaki free island.

Mahalo for your Kōkua!

Appendix B

Please Kokua

STOP AQUATIC HITCHHIKERS!™

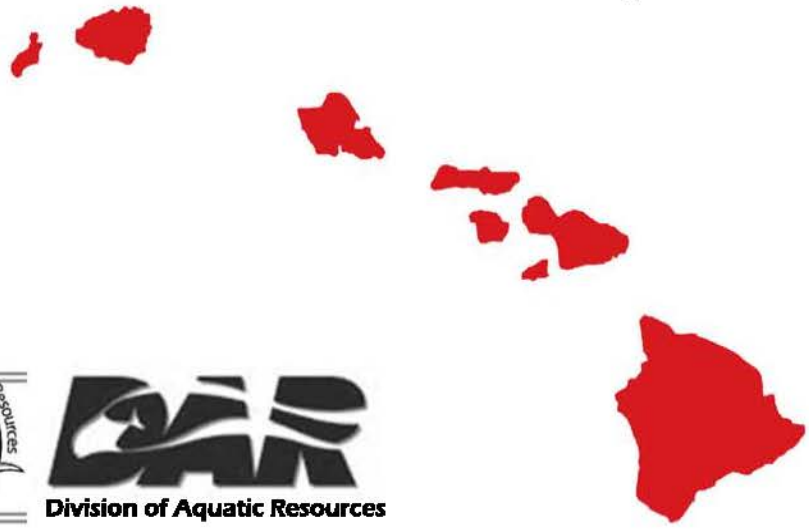
Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

Help Protect Hawaiian Waters From Invasive Alien Species:

Clean your boat and equipment before you leave this harbor

Never release plants or animals from an aquarium or from another location

Native Limu MoBettah! Don't culture or transport alien algae



DOBOR
Division of Boating and Ocean Recreation

Department of Land and Natural Resources
State of Hawaii

DAR
Division of Aquatic Resources

Appendix C

Kaho'olawe Island Reserve Commission

Permitted Trolling in Zone B

Right of Entry Permit No. _____

By this PERMIT executed this _____day of _____ 20____, the STATE OF HAWAII, KAHO'OLAWE ISLAND RESERVE COMMISSION, ("KIRC"), hereby grants to _____, whose mailing address is _____, ("Permittee") a Right of Entry upon and subject to the following terms and conditions:

1. **Grant of Right-of-Entry**. KIRC hereby grants to Permittee a Right of Entry Permit ("Permit") to enter upon the premises (defined below) for the purpose of Trolling in Zone B during scheduled Permitted Weekend dates. Permittee is responsible for explaining Permit terms to Permittee's passengers (hereinafter collectively called "Permittee") and ensuring their compliance at all times.

2. **Location**. The Permit shall pertain to the Kaho'olawe Island Reserve (hereinafter called the "Reserve") Zone B, as defined in Hawaii Administrative Rules (HAR) 13-261-3(b), and as depicted on the map attached to this Permit as Attachment "A" and made a part hereof.

3. **Term and Duration**. The Permit granted hereby shall be applicable from January 1, 2014 ("commencement date") through December 31, 2015 ("termination date"), on two (2) weekends per month as indicated by HAR 13-261-13 and attached to this Permit as Attachment "B" and made a part hereof. This Permit shall automatically terminate on the termination date, unless earlier revoked.

4. **Payment**. Permittee agrees to pay the KIRC at 811 Kolu Street, Wailuku, Hawaii, 96793 the amount of Twenty-five Dollars and no/cents ($25.00) payable fifteen (15) days in advance of the commencement date, or prior to entrance into the Premises.

5. **Use of Premises**. The Permittee shall be present and trolling at all times. "Trolling" means fishing by dragging artificial surface lures or live bait on the surface behind a vessel that is under way at sufficient speed to produce a wake. The Permit shall be limited to Permittee shall not make, unlawful, improper, or offensive use of the Premises.

6. **Compliance with Laws and Regulations**. Permittee shall, at all times during the term hereof, comply with all applicable Federal, State, and County laws, rules and regulations, and shall secure any and all necessary governmental and other approvals and permits. See http://kahoolawe.hawaii.gov/rules/CHAPTER_6K.pdf and http://kahoolawe.hawaii.gov/rules/13-261_final.pdf for the rules and penalties pertaining to the Reserve.

7. **Prevention of Invasive Alien Species (IAS)**. The permittee will be held accountable to prevent any invasive alien species, plant or animal (ie. invasive algae, barnacles, etc.), into the Reserve in regard to the marine environment. Vessel hulls will be free of any IAS.

8. **Revocation**. The KIRC may amend, suspend, or revoke the Permit if Permittee has acted in violation of any Permit term. Permittee agrees to be bound by the terms and conditions of the Permit and any amendments to this Permit.

9. **Commercial Activities**. Commercial activities are strictly prohibited. "Commercial activity" means any activity carried on for a profit, fee or for the exchange of goods and services including every kind of commercial enterprise, recreational activities offered for a fee, and taking or removing any aquatic life, mineral or vegetation for the purpose of sale or barter. All fish caught under this Permit are for home consumption only.

10. **Fishing Regulations and Conditions**. Permittee is prohibited from bottom-fishing or the use of bottomfish longlines. "Bottomfish longlines" means a type of fishing gear or fishing method used to take bottomfish consisting of weighted mainline, with attached shorter branchlines with fishing hook or hooks that is either laid on the ocean bottom or suspended horizontally near the ocean bottom with floats. Fish that are out of season or are not the legal size, which are inadvertently caught will immediately be returned to the ocean, see the Hawaii Administrative Rules Regulating the Taking and Selling of Certain Marine Resources (HAR 13-95) at http://hawaii.gov/dlnr/dar/regs/ch95.pdf.

11. **Reports**: Permittee shall submit to the KIRC within fourteen (14) days after fishing date a Catch Report, which is attached to this Permit as Attachment "C" and made a part hereof. Reports may be emailed to dtokishi@kirc.hawaii.gov.

12. **Vessels**. Permittee shall be obligated for the full and total amount of any damage, injury, or loss caused by Permittee connected with this Permit.

13. **Non-transferrable**. This Permit or any rights hereunder shall not be sold, assigned, conveyed, or otherwise transferred or disposed of.

14. **Additional Terms and Conditions**. The KIRC reserves the right to impose additional terms and conditions, if deemed necessary.

IN WITNESS WHEREOF, KIRC and Permittee have caused this Permit to be executed as of the day and year first above written.

KIRC:

By_____
Michael Naho'opi'i
Executive Director

PERMITTEE:

By_____

IAS Biosecurity Inspection Form - E Makaʻala Kākou!

Date _____ Destination _____ # of PAX _____

Pre-Launch - Please circle all appropriate.

- Have PAX been briefed on Biosecurity Protocols (check gear) Y/N?
- Are you transporting Soil/Vegetation (plants, produce) Y/N?
- If Yes, was it inspected Y/N? No SOIL! Inspector Initials _____
- Were any organisms (ants, lizards, insects) found Y/N?
- If Yes, was it collected per protocols (Rapid Response Kit, Picture, IAS Quarantine Form) Y/N?

Post Launch

- Is all ʻōpala secured into a metal trash bin Y/N?
- Are any lines, ropes, nets, ladder hanging off of `Ohua Y/N?
- Is the Front Ramp up Y/N?
- Comments:_____
- _____
- _____
- _____

Name _____ Signature_____

- Hawaiʻi Invasive Species Council -
Kahoʻolawe Island Reserve Commission

Mahalo for Keeping Kaho`olawe IAS free - E Makaʻala Kākou!

Appendix D

Invasive Alien Species (IAS) Quarantine Form - Kahoʻolawe

	Information		Comments
1	Name(s)		
2	Date		
3	Time		
4	Location		
5	IAS Common Name		
6	IAS Taxa		
7	Number of individuals		
8	Organism Type[1]		
9	Take Picture		
10	Other		

[1]Please not if IAS is a Plant, Insect, Ant, or Animal.

KIRC mainline (808) 243-5020.

or Please Call Hawaii Pest Hotline if needed at: 1 800 643-PEST.

Or online; http://reportapest.org

U.S. Department of Agriculture

IAS Rapid Response Kit Contents

1. Insecticide
2. Glass Jars/Vials
3. IAS Quarantine Forms

Please let KIRC Biosecurity personnel know if any items in the IAS Rapid Response Kit need to be replaced.

Appendix E.

Kihei Nursery Pesticide Use Log

Entry	Date	Time	Name	Pesticide Used	Concentration (%)	Carrier/Surfactant?	Total Quantity Pesticide	Area Sprayed	Comments
1	Aug 1 2016	8:00AM	Joe Staff	RoundUp Pro	2.5oz/gal = 2%	Water/no	2.5 oz	Fenceline	Also pulled 2 ALTPUN
2									
3									
4									
5									
6									
7									
8									
9									
10									

Rodent Control Log

Kihei Boat House Facility

Contrac (active indgredient - 0.005% Bromadiolone)

1 oz. bait blocks (3-16 blocks per label)
Sticky Traps (S), Snap traps (ST)

"X" indicates a number is needed

When filling in caught or killed index indicate mice (M), rats (R).

Date MM/DD/YYY	(X) traps set (if needed)	Caught or killed index (X)	Number of rats sighted monthly (X)	Placed (X) new stations	Refreshed bait in (X) stations	Total lbs. of bait used (X)	Initials - Comments

Include diagram of rodent control at facility

Dispose of spoiled bait at an approved waste disposal facility

Service schedule monthly or sooner as needed if rodent sign is evident