



PII NEWS

SEPTEMBER 2013

This summary of invasive species management activities undertaken by people and agencies that the Pacific Invasives Initiative (PII) works with is collated and circulated by the PII Team. Contributions are welcome. Thanks to all those who contributed to this one! Feedback is also welcomed - contact either the PII Team (pii@auckland.ac.nz) or the people directly involved in projects. The views expressed by authors are not necessarily those of PII. Visit our website or find us on Facebook for more information.

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PII ACTIVITIES

Island Biosecurity Training, 24-27 September 2013, Apia, Samoa

PII successfully completed its sixth Island Biosecurity Training Course. This one was run over 4 days in Apia and attended by 21 quarantine and environment staff from agencies in the Cook Islands (1), French Polynesia (2), Kiribati (2), Papua New Guinea (1), Samoa (7), Tokelau (5), Tonga (2) and Vanuatu (1). These participants were joined by a practitioner from an NGO in French Polynesia, Société d'Ornithologie de Polynésie "SOP Manu" and another from an NGO in Mexico, Grupo de Ecología y Conservación de Islas. Introductory speeches were given by David Sheppard (Director General, SPREP), Pelenato Fonoti (Assistant Chief Executive Officer, Quarantine, Samoa) and Souad Boudejals (Programme Manager, PII).

The purpose of the training was to strengthen knowledge and skills for the effective planning and implementation of island biosecurity and the outcomes were to:

- Understand the importance and principles underpinning island biosecurity
- Know how to assess biosecurity risk pathways and how to mitigate for these
- Know how to plan and implement surveillance
- Know how to plan for and implement incursion responses
- Know how to communicate about biosecurity



*Ant identification
(Photo: Posa Skelton)*

*Learning about rodent surveillance tools
(Photo: Marie Fourdrigniez)*



Participants' experience and skills ranged from those in senior roles to those just beginning to work in biosecurity and invasive species management. The training was characterised by a high level of participation and feedback from participants was very positive. In particular, they reported that there was a good mix of theory and practical work, the planning tools were useful and applicable to their work, good examples were used, they learned about the importance of biosecurity and they enjoyed working in groups and the healthy level of competition between groups.

Participants also made suggestions for refining the course which included: increasing the duration, using more examples from the Pacific (Note: *with regards to more examples from the Pacific, we invite all of you working in the region to email us examples on prevention, surveillance and incursion response for future courses*) and interestingly there was comment about looking at accreditation for the course.

The training team consisted of two PII staff (Souad Boudjelas and Bill Nagle) and two Subject Matter Experts (invasive ants, Monica Gruber, Victoria University of Wellington; incursion response, Karyn Froud, consultant). Thanks to Tony Talouli from SPREP for presenting an introduction to ballast water and hull fouling.

The course was developed and delivered by PII and hosted by PILN and SPREP at their campus in Apia. The course was funded through a joint PII-PILN grant from CEPF for the Polynesia-Micronesia Biodiversity Hotspot. PII's staff time was covered by a grant from the David and Lucile Packard Foundation.

Thanks to all the participants for their willingness to contribute and to the SPREP team for their support and hospitality especially, Posa Skelton and Makerita Atiga. Thanks also to Monica and Karyn for their specialist inputs - it was a pleasure to have them as part of our team.

Capacity Development Strategy for Invasive Species Management in the Pacific endorsed by SPREP member countries

PII and PILN are delighted to announce that the Capacity Development Strategy for Invasive Species Management in the Pacific was endorsed by SPREP member countries at their 24th Annual Meeting.

A strategic approach to the design and delivery of Capacity Development for invasive species management in the Pacific is necessary to meet the increasing demand for capacity development to manage invasive species threats and impacts in the foreseeable future.

The purpose of the Capacity Development Strategy for Invasive Species Management in the Pacific is to "guide

investment efforts by agencies working on strengthening the capacity of Pacific Island Countries and Territories to manage invasive species for the benefit of Pacific islands biodiversity, ecosystems and people".

The strategy was prepared for PII and PILN by James Atherton in consultation with Pacific practitioners and members of the Pacific Invasives Partnership (PIP) and we would like to thank all those who contributed.

The strategy was funded through a joint PII-PILN grant from CEPF for the Polynesia-Micronesia Biodiversity Hotspot.

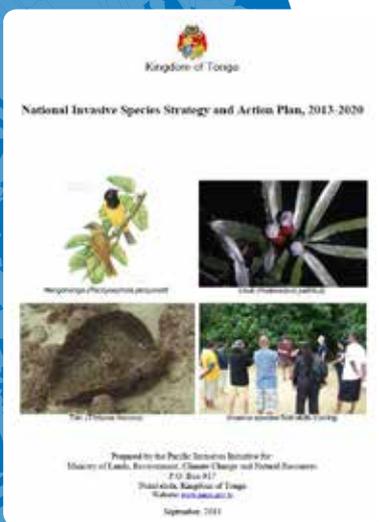
National Invasive Species Strategy and Action Plan, Kingdom of Tonga

PII completed the preparation of Tonga's National Invasive Species Strategy and Action Plan (NISSAP) for the Ministry of Land, Environment, Climate Change and Natural Resources (MLECCNR) in September 2013, under the leadership of Asipeli Palaki, Director. The draft NISSAP was approved by key stakeholders at a workshop in Nuku'alofa in August and subsequently submitted to MLECCNR.

Development of the NISSAP was a team effort and required full engagement in the process from all of those involved; Government agencies, civil society organisations and advisers. A desktop review of reliable, existing public domain information was used as the starting point, questionnaires were used to collect further information and two consultation workshops with government and non-government stakeholders provided discussion and agreement on priorities.

The NISSAP is aligned with the Guidelines for Invasive Species Management in the Pacific and contains activities that address invasive species under the Thematic Areas of the Guidelines. Preparation of the Plan was funded as one of Tonga's priority activities under the UNEP-GEFPAS implemented and SPREP executed "Prevention, Control and Management of Invasive Alien Species in the Pacific" project.

PII would like to thank: government and civil society stakeholders for their participation and contribution at the planning workshops; Viliami Hakaumotu and Losana Latu of MLECCNR for assistance with organisation of the workshops; the Invasive Species Specialist Group for providing information and feedback on the draft NISSAP; the SPREP team for their contribution at the workshops and for their feedback on the draft NISSAP.



Island Eradication Advisory Group Meeting, 22 August 2013, Auckland New Zealand

PII had the pleasure to host and participate in another meeting of the New Zealand Department of Conservation (DOC) Island Eradication Advisory Group (IEAG) at the University of Auckland's Tamaki Campus. The IEAG is a group of world-leading experts that advise project managers on the planning and implementation of invasive mammal species eradication on islands.

To date, the IEAG has provided significant and much valued input to several projects in the

Pacific islands region. PII is very grateful to the IEAG for their continued support to us and our Pacific partners. At this meeting reviews and recommendations were made for the following eradication projects: Great Mercury Island, New Zealand; Macquarie and Lord Howe Islands, Australia; Henderson Island, Pitcairn Islands; Vahanga Atoll, French Polynesia.

Follow up to Invasive Plant Management Training

Two follow-up visits were made to reinforce the learning from the PII Invasive Plant Management Training Course held in Apia in 2012. The first was to the National Environment Service on the island of Mauke in the southern Cook Islands where three tree species are taking over important areas. Management information is not readily available for the target species and a trial was established (see article below for more information). The red passionfruit (*Passiflora rubra*) control programme instigated after the workshop is progressing well and now surveillance for and removal of newly-germinated seedlings is all that is required. PII donated equipment to the National Environment Service for this work.

The second visit was to MNRE Parks and Reserves Division in Samoa to discuss progress on the Mt Vaea Restoration Project. Mt Vaea was devastated by Cyclone Evan last year and considerable effort has gone into re-planting and track maintenance. PII donated equipment to MNRE for the restoration work, including a device for easily extracting saplings from the ground (see < <http://www.pullerbear.com/compare.html> >). The project is shortly to be reviewed and plans made for the next steps.

Invasive Plant Management Equipment

As a follow up to its Invasive Plant Management training course, PII has been working with practitioners to develop a safe, targeted application system for herbicide use. This has been made possible by the generosity of Andrew Duffy of ISL Animal Health (<http://www.islanimalhealth.com>) for donations of equipment. The equipment has been tested in the Cook Islands, Fiji and Samoa and PII would like to thank ISL and Andy for their assistance.



Java plum (Syzygium cumini) trees showing signs of defoliation four weeks after being treated with herbicide in a trial on Mauke Island, Cook Islands. (Photo: Oskar Guy)

PII SUPPORTED AGENCIES

COOK ISLANDS: Invasive Tree Management on Mauke

BASILIO KAOKAO, National Environment Service & **OSKAR GUY**, PII Volunteer

Greetings from Mauke Island located in the beautiful Cook Islands. In this article we will talk about a new project currently underway on Mauke Island, the aim of which is to remove three invasive species of trees acacias (probably *Acacia crassicarpa* and *Acacia auriculiformis*) and Java plum (*Syzygium cumini*) also known locally as pistash.

This Project is managed by Basilio Kaokao the local National Environment Service Officer on Mauke, in collaboration with the Mauke Agricultural Department and with technical support from the Pacific Invasives Initiative (PII).

Java plum was first introduced to Mauke as a wind-break for the orange plantations in the early 70's and, like many other plants introduced into the Pacific, adapted very well to its new environment and has now spread over much of the arable soil on the island. The species of acacia currently targeted are two of the five which were introduced in the 80's for firewood for a proposed steam-fired Power Station that was never built.

The project started this year with Basilio identifying and locating the target species for removal. In July Basilio was

joined by Oskar Guy and Bill Nagle both from PII. Bill spent a week on Mauke and during that time he provided training for the field crew on the correct application of herbicide, safety requirements when applying herbicide and demonstrating the different techniques to control these invasive trees.

As part of Bill's time on Mauke trials were set up to determine the most effective control method as, like many other invasive plants, there is no clear "best practice" method for acacias and Java plum. All sites contained mature and juvenile plants and seedlings. Oskar spent six weeks on Mauke providing technical advice and support to Basilio and the field crews with trials.

The first site, a block of Acacia (*Acacia crassicarpa*) was treated using the hack-and-squirt method: tomahawks were used to make cuts around the base of the tree (as close to the ground as possible), herbicide (100% *glyphosate*) was then applied at 10ml/10cm DBH (diameter at breast height). Where possible, small Acacia were hand-pulled.

The next site selected was also a block of acacias with both target species present (*Acacia crassicarpa* and *Acacia auriculiformis*). Several treatment methods were trialled here:

- Hack-and-squirt with 100% *glyphosate*
- Cut-stump, cutting trees with a DBH of less than 10cm at the base with a chainsaw and applying a *glyphosate* gel herbicide
- cutting a single band with a chainsaw around the base
- cutting a double band with a chainsaw around the base
- ringbarking smaller trees (less than 10cm DBH) removing roughly 12cm of outer bark

The final trial block was an area thick with Java plum (*Syzgium cumini*). The trial was conducted to determine best amount of herbicide required (and to see if *glyphosate* is even effective).

- Four trees were hacked but left free of herbicide as a nil treatment
- four trees were treated with 5ml/10cm DBH (hack-and-squirt)
- four trees treated with 10ml/10cm DBH (hack-and-squirt)
- four trees treated with 15ml/10cm DBH (hack-and-squirt)

All remaining trees over 10cm DBH were treated with 10ml /10cm DBH, those smaller than 10cm DBH were cut and a *glyphosate* gel was applied to the remaining stump.

Regular monitoring continues to assess the effectiveness of these treatments. The results in the fourth week after application were looking promising with the majority of the Java plum treated with herbicide with many leaves turning brown and generally looking sick especially those with 10 ml or more herbicide per 10cm DBH, the acacia treated using the hack-and-squirt method with *glyphosate* has lost all leaves, however those cut with bands and those ringbarked (no chemical added) look like after suffering an initial shock they are now recovering.

About 90% of cut stumps (those with DBH of less than 10cm) show no sign of regrowth and overall the results are looking promising, however the next few months of monitoring will ultimately determine which treatment was successful. So hopefully then these areas will open up and the native flora of Mauke will rise up to replace them and the native fauna increase as a result, making Mauke just that little bit more beautiful.



**Targetted herbicide application, Java plum trial (L) The invasive plant management team in front of invasive acacias (R)
(Photos: Bill Nagle)**

FSM-POHNPEI: Invasive Species Activities

BEJAY OBISPO, Conservation Society of Pohnpei

The Conservation Society of Pohnpei (CSP) and its partner agencies wish to share work they have been doing on invasive species. Over the past few months community awareness programs have been conducted to educate local people on the impacts of invasive species and the threat they pose to our islands' natural environment.

As a result of our awareness programs local communities have been assisting with the implementation of our invasive plant projects by reporting new sightings, conducting biosecurity and by volunteering to do ground work (i.e. actual control of plants).

Invasive plants that are been targeted for management are: *Piper auritum*, *Antigonon leptopus*, *Coccinia grandis*, *Clerodendrum chinense*, *Mikania micrantha*, *Schefflera actinophylla*, *Thunbergia grandiflora* and *Piper lolot*. We are very pleased to report that we have now reduced the Octopus tree and Honolulu rose to zero density in known sites. This is a great achievement.

List of species and known target sites:

Species	No. of known sites	% of sites removed
False sakau (<i>Piper auritum</i>)	126	94%
Chain of love (<i>Antigonon leptopus</i>)	33	94%
Mile a minute (<i>Mikania micrantha</i>)	22	64%
Ivy-gourd (<i>Coccinia grandis</i>)	15	87%
Octopus tree (<i>Schefflera actinophylla</i>)	33	100%
Purple trumpet (<i>Thunbergia grandiflora</i>)	9	89%
Honolulu rose (<i>Clerodendrum chinense</i>)	7	100%
Lolo pepper (<i>Piper lolot</i>)	3	0%

CSP would like to thank PII for the donations of application and safety equipment for our invasive species management work.



Community preparing to undertake work on mile a minute (L). The Mayor of Kolonia participated in the removal of chain of love (R) (Photo: CSP)

FIJI: Empowering local conservation groups to lead on conservation actions on their seabird islands

ELENOA SENILOLI, NatureFiji-Mareqetiviti

NatureFiji-MareqetiViti is working with many local communities to conserve their seabird islands by educating and empowering local land-owning communities to appreciate their natural resources through sustainable management.

Under the previous BirdLife Fiji projects, both forest and seabird island communities from around Fiji have established local conservation groups to help with the conservation and management of their Important Bird Areas (IBAs). In an effort to build these local conservation groups, NatureFiji-MareqetiViti organized a local community group empowerment workshop, where local conservation groups came together to discuss project progress, share lessons learnt and encouraged each other to progress with their projects.

The two day workshop was facilitated by NatureFiji-MareqetiViti with participants from Department of Forestry, Ksaravi Consultancy and Ra provincial office. Topics covered included the establishment of SSGs, basic concepts of monitoring and biosecurity procedures for Site Support Groups (SSG), development and management of SSGs, challenges and sustainability of SSGs, development of sustainable livelihood projects, such as establishing community eco-tourism projects, sandalwood nursery and fundraising opportunities through provincial offices.

After the workshop, the local conservation groups had a better understanding of their roles as local conservation groups (helping NatureFiji in conservation actions), how to implement proper biosecurity protocols, and how to better manage and report sustainable livelihood project progress to stakeholders.



Monuriki representative providing progress updates (L). Vatu-I-Ra SSG discussing workplan (R) (Photos: Elenoa Seniloli)

FRENCH POLYNESIA: Second campaign to control *Acridotheres tristis* and *Pycnonotus cafer* on Tahiti Island, 2013

SUSANA SAAVEDRA-CRUZ, SOP Manu

This piece is an update to an article that appeared in the June 2013 PII Newsletter (French Polynesia: First control campaign for *Acridotheres tristis* and *Pycnonotus cafer* on Tahiti Island, 2012 From Susana Saavedra-Cruz, Thomas Ghestemme & Caroline Blanvillain).

Susana Saavedra, an invasive bird management expert, has been contracted by la Société d'Ornithologie de Polynésie (SOP Manu) to undertake a second control campaign on mynas (*Acridotheres tristis*) and bulbuls (*Pycnonotus cafer*). Controls will be done on the island of Tahiti, French Polynesia and will run from mid August to the end of November 2013.

The goal, in 2012, was to enhance the breeding success of the critically endangered Tahiti monarch (*Pomarea nigra*) by reducing harassment from mynas and bulbuls. The same goal still holds for 2013.

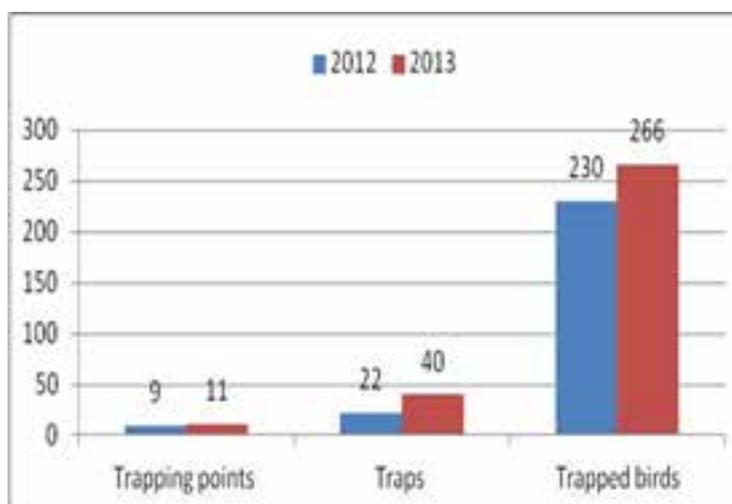
The following table and graph shows the differences between the two campaigns. The table compares them for both years, by providing data from the 15th to the 31th August

Concept	2012	2013
Personnel	3-7	1-2
Municipalities covered	2	2
Both Municipalities support	yes	yes
Local community general support	yes	yes
Publicity	yes	no
Volunteers for trap building	yes	no
Strategy		
- Random traps	yes	yes
- Reducing roost-sites	yes	yes
- Transect traps	no	yes
Cars available	2	1

In 2012, a random trap system was used around the valleys of Papehue, Tiapa and Maruapo and proved to be an effective system to reduce the targeted invasive birds. This system was effective because of the number of people (3-7) involved in attending the trappers' network. The team was composed of 3 to 7 people, paid by SOP Manu. Three were permanent staff, one consultant (Susana Saavedra) and three locals contracted under a local government project to create temporary jobs. This year the project has only employed one fulltime consultant (Susana Saaverda), one person who works four hours/day and sometimes another person who will do work for one or two days/week in the mornings.

This year, in the valley of Maruapo we are testing the transect format of traps as a new approach. Transects are placed to protect Maruapo Valley against invasive birds flying in from North East and North West roost-sites. Transects cover the shortest land distance from sea side to mountain side in the coastal areas. The distance between traps is not standardized. This is to compensate for the reduced number of people involved in the project (1-2). The set up allows for one fieldworker to survey 20 to 25 traps within a relatively small distance (about 863m). For the valleys of Papehue and Tiapa the random trap system is still effective. However, for this second campaign we have selected only trappers who could work independently (i.e. trappers who could care for the decoy birds (live birds used to attract others into the traps) and the trapped birds).

This year we have trapped more birds than last year (see graph providing data 15 - 31 August), even though there are fewer birds to be trapped as a result of the first control campaign in 2012 (when we removed more than 2700 invasive birds) and having less manpower to work with. SOP Manu established that the reduction after the first trapping campaign of invasive mynas was by a factor of 4, and for bulbuls by a factor of 2.5.



Comparison of data from 15-31 August for both campaigns 2012 and 2013

With limited manpower we still managed to increase trapping point locations by 31% this year. Last year volunteer trappers in the random trap system were considered as one trapping point each; this year trapping points include both voluntary trappers (independent) with traps in their gardens, and traps set up in the transect system.

This year, we are also managing 81% more traps than last year for the same period of time. It was an advantage to have the traps already built from the last campaign. All the traps were checked, and delivered quickly to targeted areas, as we already had the information and contacts from last year.

The data analyzed here covers the first sixteen days of

each campaign. The data collected at the end of November 2013 will allow making a real comparison between the two trapping systems, random or transect traps.

SOP Manu would like to acknowledge PII's contribution to my travel costs from the Canary Islands to Tahiti to undertake this second campaign for the control of myna and bulbul and for giving me the opportunity to present my work at the Centre for Biodiversity and Biosecurity, University of Auckland.

The next update will be provided in the December 2013 edition of the PII Newsletter. For more information please contact Susana Saavedra (odisea64@hotmail.com)

FRENCH POLYNESIA: Protecting the last inhabited rat-free islands of Rimatara and Ua Huka

CAROLINE BLANVILLAIN, SOP Manu

Preventing the arrival of the black rat (*Rattus rattus*) on Rimatara Island, Austral Archipelago, French Polynesia has been identified as priority for French Polynesia by SOP Manu since the invasion of this island by the black rat would lead to the extinction of the only remaining population of the 'ura or Kuhl lorikeet (*Vini kuhlii*) in French Polynesia. It will also cause a reduction in the population of the 'oromao or Rimatara warbler (*Acrocephalus rimatarae*), an endemic species, found only on this island. The 'ura has already disappeared from Rurutu and four islands in the Cook Islands because of the black rat.

Similarly, Ua Huka is the last inhabited island in the Marquesas still free of black rat, and its arrival would mean the extinction of pihiti or ultramarine lorikeet (*Vini ultramarina*) and pati'oti'o or Monarch Iphis (*Pomarea Iphis*), two endemic species found only on this island. The pihiti is now extinct on Nuku Hiva, Ua Pou, Hiva Oa, Fatu Hiva and Tahuata (where it was introduced in the 90s) and the leading cause is the black rat.

Both Ua Huka and Rimatara are currently free from black rats. Unless these two islands are protected against a possible invasion by the black rat, French Polynesia faces a significant risk of losing its iconic species.

Key results to date:

Objective 1: Protect the islands from black rats

- SOP Manu has trained a biosecurity guide on each island and established a monthly

trapping regime (30 bait stations have been placed at Ua Huka wharf; and 25 have been placed at Rimatara wharf) which is being carried out by the guide. No black rats have been trapped since the trapping began.

- Goods coming off the boats are inspected by the biosecurity guides.
- Each island's airport has 5 bait stations.
- Good cooperation has been received from boat companies, airports, independent wharves at Papeete (Tahiti) and the copra-oil industry.

Objective 2: Engage local people in the protection of their islands

- A Local Conservation Group (LCG) made up of volunteers from the community was established on each island and to date they have been working in engaging the community in biosecurity and several meetings have been held with 10-50 inhabitants. Both LCGs are working towards becoming associations.
- In addition to inspection, quarantine for goods (except cars) that may harbour rats has been agreed on by 379 out of a total of 381 adults in Rimatara and by all 320 adults in Ua Huka. This has been initiated on both islands. Goods are also inspected for the little fire ant.

Objective 3: Promote the islands' natural heritage

- A new web site will be available soon on www.manu.pf to promote eco-tourism
- Flyers and articles were prepared and distributed. Forty tourists have already visited the islands to see the birds in the last few months.

Social, environmental, and economic benefits of maintaining island biosecurity:

The inhabitants of each island have now an enhanced understanding of the benefits of their islands remaining black rat-free including:

- Risks to human health: black rats are vectors of leptospirosis



Ultramarine lorikeet (*Vini ultramarina*)
(Photo: Caroline Blanvillain)

- Risks to copra production: rats destroy 25 to 95% of copra production on islands. Ua Huka and Rimatara are leaders in copra production within the Marquesas and Austral Archipelagos as a result of their black rat-free status. The arrival of black rats would cost each year an estimated 12 million CFP on Rimatara and 14.3 million CFP on Ua Huka (based on a 50% loss of copra production). While island biosecurity will cost only 400,000 CFP on Rimatara and 500,000 CFP on Ua Huka. These figures were highly convincing to the local communities.
- The magnificent lorikeets are appreciated as cultural and tourism treasures for the population.
- Schools on Rimatara have been involved (schools on Ua Huka will be involved in November).
- Two biosecurity guides have been employed and trained, and are considered as local heroes by the population.
- The inhabitants understand the importance of biosecurity between Tahiti and their islands, as they must protect themselves against invasion by black rats as they have the most to lose.
- Inhabitants of both islands and the local authorities understand and support the maintenance of biosecurity on their islands

Monitoring and evaluation:

Each biosecurity guide has a senior manager, who is a member of the LCG and a SOP volunteer.



A report of activity (i.e. number and size rats trapped, boats inspected, bait changed, number of people (tourists, children, local inhabitants) that come to see the birds) is sent monthly to SOP Manu. SOP Manu staff visit the island every six months to follow up on activities.

Project Partners and their roles

SOP Manu: Set up biosecurity and follow up on implementation

LCGs on Ua Huka and Rimatara Islands: help with the implementation of biosecurity and community engagement

Direction de l'Environnement de la Polynésie Française (DIREN) and the Phytosanitary Services: Assistance with biosecurity legislation and quarantine matters.

Pacific Invasive Initiative: technical advice and support on biosecurity and review of project documents.

This work was funded by the European Union, Critical Ecosystems Partnership Fund, BirdLife International, DIREN and TE Me UM funded the project. Thank you for the support. I would like to acknowledge SOP Manu staff and office and all the partners



*The endangered Rimatara lorikeet (Vini kuhlii) (L). Training local community on rat identification (R)
(Photo: Caroline Blanvillain)*

REGIONAL UPDATE

Pacific Island Ecosystems at Risk

JIM SPACE, PIER

A new edition of the Pacific Island Ecosystems at Risk (PIER) web site was recently posted. It now includes over 1900 plant species of potential concern to Pacific islands. Over 800 new photos are included in this edition, as well as 42 new weed risk assessments. There are now over 1700 risk assessments listed. The PIER web site can be accessed at <http://www.hear.org/pier/>

Note that PIER's sister site, Hawaiian Ecosystems at Risk (HEAR) is no longer funded and, while it will be available on the server indefinitely, it will no longer be updated. However, this does not apply to PIER. PIER is maintained and updated on a volunteer basis and will continue to be available to provide information on invasive plants in the Pacific region. For further information or to request species be added to PIER, contact Jim Space at pier@hear.org

GLOBAL UPDATE

International Experts Convened to Improve Tropical Island Rodent Eradications, 19-21 August 2013, Auckland, New Zealand

A tropical rodent eradication review was launched with the convening of a meeting of an international group of experts at the University of Auckland, New Zealand. The goal of the review is to develop recommendations for improving the success rates of tropical island rodent eradication. More than 30 experts in island rodent eradication, island ecology, rodent ecology, and toxicology came together at meeting to review historical data, analyze successful and unsuccessful projects, and discuss new ideas and approaches to increase the success rates of rodent eradication on tropical islands.

Eradicating invasive alien species from islands is a tool proven to protect biodiversity and help restore ecosystem processes. Worldwide, there have been more than 400 successful eradication of invasive rodents from islands and about 50 unsuccessful attempts. Analysis of historical eradication reveals that efforts to eradicate rodents from tropical islands have been less successful than projects in higher latitudes. "There is increasing demand for eradication to help counteract the growing extinction crisis, particularly in tropical areas where

biodiversity is greatest", said Bill Waldman, CEO for Island Conservation. "This review will improve the rate of success by ensuring that the island restoration community has the best eradication advice from the world's experts."

The tropical rodent eradication review is being led by a consortium of groups including Island Conservation, Pacific Invasives Initiative, Royal Society for the Protection of Birds, BirdLife International, Conservacion de Islas, New Zealand Department of Conservation and the US Department of Agriculture. The first stage in the review included an analysis of completed rodent eradication to evaluate the lessons of past projects. The review is expected to conclude this year with publication of recommended best practice guidelines for tropical rodent eradication that will also be made available through the PII Resource Kit (<http://www.pacificinvasivesinitiative.org/rk/>).

For more information please contact: Brad.Keitt@islandconservation.org



*International group of experts at the Tropical Rodent Eradication Review
(Photo: University of Auckland)*

EXPERT OPINION

Feral pigs do have a negative impact

CHERYL KRULL, Center for Biodiversity and Biosecurity, School of Biological Science, University of Auckland

As is the case in other Pacific island countries, many New Zealanders view pigs (*Sus scrofa*) as a resource rather than an invasive species and regard feral pigs as an important food source. Consequently this species is generally not considered a high priority for eradication or control efforts. Although there was a lack of scientific evidence for impacts, the apparent

environmental impacts of feral pigs were regarded as high. To reduce conflict with communities, land managers require evidence of the negative impacts of feral pigs to justify any decision to manage them in high-value conservation areas.

Despite the presence of feral pigs in New Zealand for more than 200 years, the impact of this invasive species on New Zealand

ecosystems had not been adequately measured until 2012. This PhD research quantified feral pig impacts and recommended appropriate management strategies. This involved investigating the impacts of feral pigs on vegetation, ecosystem processes and plant pathogen transmission, assessing current management regimes and simulation modeling to make management recommendations.

The research project evaluated the impacts associated with ground disturbance by pigs, by excluding pigs from previously disturbed areas. This showed that feral pig ground disturbance immediately affects plant communities through direct removal of vegetation, but also has indirect effects via modification of soil characteristics and increasing decomposition rates. Seedling abundance and species richness can recover if allowed, although pigs are known to repeatedly return to previously disturbed areas, causing prolonged disturbance. If left unprotected, these areas may remain in a constantly disturbed state.

Invasive soil borne pathogens are a major threat to forest ecosystems worldwide. The newly discovered soil pathogen, *Phytophthora* 'taxon *Agathis*' (PTA) is a serious threat to endemic kauri (*Agathis australis*: Araucariaceae) in New Zealand and the research examined the potential for feral pigs to act as carriers of PTA. 19 species of plant pathogens were detected in the soil carried by pig trotters and snouts, including a different *Phytophthora* species (*P. cinnamomi*). Although no PTA was isolated from the samples, this was likely due to difficulties with the methodology used to detect PTA, rather than an absence of PTA itself. Investigation is continuing into feral pigs as carriers of this disease and pigs should be regarded as carriers of soil pathogens based on the numerous other species found in the soil carried on pig trotters.

Another part of the research determined the effects of a three-year management program on pig density and the extent of pig ground disturbance (impact) in the Waitakere Ranges, Auckland. This information was used to add limits to a model created in 2005 by Choquenot and Parkes. The model links pig ground disturbance rates to pig density and was used to simulate different management scenarios and predict their effect on reducing ground disturbance. The model was also used to provide management recommendations for pig control in the Waitakere Ranges by identifying the management scenarios that would be most effective and efficient in reducing pig ground disturbance.

The modelling determined that the success of fixed frequency control scenarios (e.g. reducing numbers every three months) depended on maintaining kill densities with each event. Any decline in kill density could lead to a recovery in pig populations and a continuing increase in pig ground disturbance levels. The likelihood of maintaining the required kill density in the long term was low and the lack of outcome monitoring in this scenario could lead to increasing disturbance levels despite maintaining a regular pig removal regime.

Therefore, despite higher costs, a monitoring-based control regime (triggered when ground disturbance hit a 5% threshold) was recommended for the continued management of feral pigs in the Waitakere Ranges.



Feral pig enclosure cage (Photo: Cheryl Krull)



Pig disturbance (Photo: Cheryl Krull)



Pig trotter carrying a significant amount of soil, and plant material (potential for spreading weed fragments) (Photo: Cheryl Krull)

This guaranteed a reduction in ground disturbance, which would consequently reduce vegetation and ecosystem impacts and also the probability of pigs spreading plant disease.

The results also indicated that increasing the kill effectiveness could theoretically drive the pig population in the Waitakere Ranges to zero-density and provide a more cost effective solution. Whilst it may be possible to achieve this increase with additional hunting teams or increased culling frequency, this would dramatically increase the cost of pig control.

This research has highlighted that feral pigs are having a negative impact on New Zealand native ecosystems and that they should be controlled in areas of high conservation value. The results highlight the need to further investigate feral pig impacts and best management practices in countries where they are currently considered a low priority.

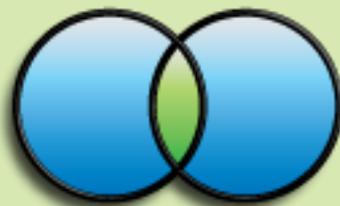
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