

Inside this issue: Pages

Rugby World Cup 2011 1

PII ACTIVITIES

Acknowledgements 1

The New Zealand Biosecurity Institute National Education & Training Seminar 1-2

Shakespeare Open Sanctuary 2

On the job training: Invasive Plants 2-4

Invasive Plant Management Training Course Update 4

PROJECT UPDATES

Fiji: Restoration of Monuriki and Kadomo Islands 4-6

New Caledonia 6-7

Palau: Conservation of endangered species through the removal of invasive mammals in Kayangel State and the ongoing biosecurity of Kayangel's natural and human resources 7-10

REGIONAL INTEREST

New 'Managing animal pests' section of the New Zealand Department of Conservation website 10

A recent reference: 10

Funding information—Terra Viva Grants Directory 10

EXPERT OPINION

Invasive ants in the Pacific 11

Ant Surveillance Methods 12

Yellow Crazy Ant Eradication in NE Arnhem Land Australia 13

Pacific Island Rodent morphology dataset 13

Tricky Terminology: 'Invasive Alien Species' or 'Pest' and 'Weeds' (Part 2) 13-14

Ant Specimen Preparation Techniques for Identification 15

The PII Project Process 16



This summary of invasive species management activities 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 Newsletter! 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 further information.

Rugby World Cup 2011

PII congratulates the Flying Fijians, 'Ikale Tahi and Manu Samoa on their successes on the rugby field! The Pacific presence in Auckland has never been stronger with the Pacific Islands Forum preceding the RWC, supporters out in force for their teams and many Pacific events held at venues around the city.

PII ACTIVITIES

Acknowledgements

PII is pleased to announce that we have recently completed two major projects. The first one, funded by The David and Lucile Packard Foundation, was to develop and produce the PII Resource Kit for Rodent and Cat Eradication and the accompanying training course 'How to Eradicate Rodents and Cats on Islands'. The PII Resource Kit is available free on our website (<http://pacificinvasivesinitiative.org/rk>). Please contact us if you would like more information about the training course or to obtain a CD-Rom version of the Resource Kit (pji@auckland.ac.nz).

The second project, funded by the Critical Ecosystems Partnership Fund (CEPF), was to work with CEPF grantees to strengthen their capacity to take effective action against their priority invasive species problems. This was achieved through the provision of technical advice and support, specialist assistance, project review, planning assistance, formal and on-the-job training and the provision of information.

PII would like to thank the donors that funded the above projects and also acknowledge the core funding provided by the New Zealand Aid Programme of the Ministry of Foreign Affairs and Trade of the Government of New Zealand.

The New Zealand Biosecurity Institute National Education and Training Seminar

The 61st annual "New Zealand Biosecurity Institute, National Education and Training Seminar" (NZBI NETS) held in Auckland, New Zealand was attended by Bill Nagle and Natasha Doherty. This year's theme was "The Northern Gateway: tomorrow's pests today". Northland and Auckland are the gateway to New Zealand for visitors both welcomed and unwelcomed.

an exciting view of the fusion of ecological and engineering skills, as well as developments in surveillance for marine invasives.

Topics included:

- New Threats – identification workshops (Plants; Marine; Insects; Reptiles; Birds; Fish)
- Invasions (Invasive spread; Invasion potential; Impact)
- Techniques/technologies, Management Operations and Solutions

The possibility of new species arriving and becoming invasive remains a constant threat. The warm northern environment (warm enough for banana and taro) is a perfect home for invasives to become established.

This conference focused on how New Zealand is closing the door to the threats and fighting what is already here. It provided an opportunity to learn about advances in invasive species management such as new toxicants for feral pig control and automatically resetting traps for mammalian predators. It also provided



Tim Low (Invasive Species Council of Australia) gave a lively keynote address on 'Climate Change and Invasive Species' to the 2011 NETS Conference in Auckland, New Zealand. (Photo: Chiemi Nagle)

- Moving Forward, Biosecurity Science and Lessons Learnt
- Biosecurity Success Stories (Borders; Aquatic; Long-term Management)
- Innovations (Monitoring/Auditing; Tools; Problem Solving)
- Field trips (Urban Restoration (weed management); Rangitoto Island (multi-mammal eradication); Kauri Dieback (*Phytophthora* disease))

PII contributed to the seminars by presenting “*Biosecurity for voyaging canoes*” and officially launching the “*PII Re-*

source Kit for Rodent and Cat Eradications” which provides project managers with a practical guide to help plan and implement rodent and cat eradication projects. The two PII presentations are also available on YouTube: “*Biosecurity for voyaging canoes (Bill Nagle)*” and “*Resource Kit for Rodent and Cat Eradications (Bill Nagle)*”.

More information on NETS 2011 and NETS 2012 (*Pests in our Dynamic Landscape: The pressure is on!*) can be found at: <http://www.biosecurity.org.nz/nets/what-is-nets/>

Shakespear Open Sanctuary, Auckland, New Zealand

We would like to thank Matt Maitland, Project Manager, Auckland Council, for the opportunity to participate in the second aerial bait application for [Shakespear Open Sanctuary](#), a ‘mainland’ peninsula with a predator-proof fence (see also <http://www.sossi.org.nz/>)

The vision for the sanctuary is to create an open and accessible wildlife sanctuary that integrates public recreation, conservation and farming and which provides habitat and a linkage for native bird species to repopulate the Whangaparaoa peninsula. The importance of this relationship is reflected in the continuous movement of native species such as tui, bellbirds and kakariki between Tiritiri Matangi Island Sanctuary and Shakespear Regional Park.

A 1.7 km pest-proof fence, with automatic public access gates, was built across the Whangaparaoa Peninsula, from Okoromai Bay to Army Bay. An intensive invasive animal eradication programme is targeting: mice, ship rats, Norway rats, weasels, stoats, ferrets, cats, possums, rabbits and hedgehogs. The proven method of aerial application of cereal bait with brodifacoum toxicant was used over the 500 ha plus area. As the bait-spreading operation drew to a close, we were able to observe the helicopter loading operations and talk with the pilots and GPS monitoring crew as they

checked the flight lines and bait coverage before finalising the day’s work.



Checking the predator-proof fenceline for overspill during the aerial eradication at Shakespear Open Sanctuary, Auckland, New Zealand. (Photo: Natasha Doherty)

On the job training: Invasive Plants— From Jason Tutani, National Trust of Fiji

A skill sharing programme was developed by PII for the National Trust of Fiji (NTF). The programme provided Jason Tutani (Manager, Sigatoka Sand Dunes National Park) with the opportunity to visit weed management projects in the Auckland area with PII and meet and work with invasive plant managers in the New Zealand Department of Conservation (DOC), Whangarei, Northland conservancy.

The objectives of the skill sharing programme were:

- Reinforcement of the PII Invasive Plant Project Management Training (Sigatoka, 2-12 May 2011);
- Practical experience in weed management techniques;
- Practical experience in data collection, use of spreadsheets and analysis;

- Experience in community-based weed management projects.

The Experience

The Skill Sharing Programme in New Zealand was an enriching experience for me. The experience can be categorized into two parts: the Auckland experience and the Whangarei experience.

The Auckland experience provided the more visual learning aspect of the programme. The first two days in New Zealand were spent visiting a few of Auckland’s protected areas. Visits to the Tahuna Torea Reserve and the Arataki Visitor Centre not only reinforced the values of protected areas but showed the amount of work needed (*in situ* and *ex situ*) to ensure their perpetuity.

On the job training: —Continued from page 2

Equipped with information centres, walking trails and interpretations, these protected areas speak for conservation to their many visitors. They act as reminders of what could be lost and what needs to be done to avoid this.

In a nutshell, such places show that keeping the public aware and informed is a powerful tool in combating the loss of natural heritage. The local communities are reminded, involved and committed to conserving their natural heritage.

An important output from the Auckland experience would be the practical ideas for awareness and education that could be implemented at the NTF sites to garner support for conservation efforts.

The Whangarei experience, on the other hand, provided the hands-on learning aspect. The five days spent working with some of the Department of Conservation (DOC) Managers and Rangers in Whangarei provided a snippet into the Department's invasive work within the Northland conservancy. The three-day field experience and discussions with the DOC rangers revealed a 'more-than-meets-the-eye' depth to their weed work. Doing some field work with the endangered Brown Kiwi also provided another testimony to the destructiveness of invasive species on native populations and the need for on-going invasive management.

DOC's weed work is on a broader management level pooling together central and local governments, community and individual efforts. A common sentiment shared by the DOC Rangers on effective weed management is: good planning, effective technique, team support, data collection, reporting, monitoring and evaluation and good community support. A key lesson learnt from working with the DOC Rangers especially when dealing with weeds is 'doing what you can do'. New Zealand has over 2,000 weeds but DOC is focusing on key invasive plants that threaten the survival of native species or natural communities.

Outcomes

1. *Sharing of Resources*; Examples of weed plans, templates on weed databases, herbicide manuals and training manuals on weed management were shared by the DOC Whangarei Area team to be used by NTF. These resources will provide NTF Project Officers and field rangers with guidelines for their weed work.
2. *Professional Network*; The programme extends NTF's professional network, bringing into it the expertise and experiences of the Whangarei DOC Team. This network will provide the forum to share knowledge, successes and challenges of invasive work in Fiji and the Pacific.
3. *Knowledge and Skills*; The skill sharing programme reinforced and broadened the knowledge and skills acquired during the PII Invasive Plant Project Management Training course held in May 2011 at Sigatoka, Fiji. The brief attachment with DOC brought to light many important tools for effective weed management:

planning, community engagement, education and awareness and monitoring and evaluation.

4. *Experience*; The programme provided an enriching experience through the opportunity to work with weed experts. The DOC team are seasoned weed management experts and NTF has a lot to learn from their experiences both at an organisational level and site level.

Lessons Learnt

1. Weed management is demanding work and not all weeds can be dealt with at once. Weed management should target key invasive plants that threaten native species or natural communities. The type of weed management employed depends on a number of factors including extent of invasion, feasibility, resources, manpower and funding.
2. Well-established weeds will need a long term approach. This is usually a site-led approach. However, newly introduced weeds with a small distribution should be dealt with quickly. This weed-led approach minimises future problems of potentially invasive weeds.
3. Biosecurity is an important part of weed management too, especially in preventing the introduction or re-introduction of new weeds and spreading of diseases.
4. Monitoring and surveillance should be on-going especially for site-led and weed-led management areas.
5. Community awareness and education is a powerful tool especially in combating invasive plants and animals. An informed community would be more involved and committed to the protection of natural heritage.
6. DOC works with other organisations such as local town and regional councils in doing invasive management work. Pooled resources and manpower ensures a broad and effective weed management approach.



Jason Tutani at Arataki Visitor Centre near Auckland, New Zealand (Photo: Chiemi Nagle)

On the job training: —Continued from page 3

7. Collecting and storing weed data in a standard format is important. The standardized data is easy to work with and reporting is consistent.
8. Weed plans are important for informing and guiding weed work whether it be a site-led or weed-led plan. All plans must be reviewed from time to time.
9. Manpower is another important component of weed work. With a large pool of volunteers, large areas of weed infestations can be dealt with effectively. DOC involves a lot of community volunteers in its invasive work.
10. Herbicides are quite effective in dealing with aggressive weeds. The DOC teams that deal with herbicides are well-trained and certified. Proper herbicide storage including inventory is another important part of herbicide work.

Overall, the programme was greatly enjoyed and many lessons learnt will be shared within the National Trust of Fiji .

Invasive Plant Management Training Course Update

PII has been working with SPREP and PILN on the development of a training course in invasive plant management for the Pacific. A scoping workshop led by training consultants in July, utilised resources from previous PII and NZDOC training and the experience of PII in running training courses in the Pacific. PII worked with the consultants and senior NZDOC weed managers to develop an outline for the course. The scoping identified that an invasive plant management programme involved three

target groups (field workers, project managers, programme developers) and that three modules would be required: Module 1, Prioritisation and programme development; Module 2, Project management; Module 3, Field skills.

Modules 1 and 2 are being developed and individual agencies will be assisted to provide the field training that is necessary for their staff.

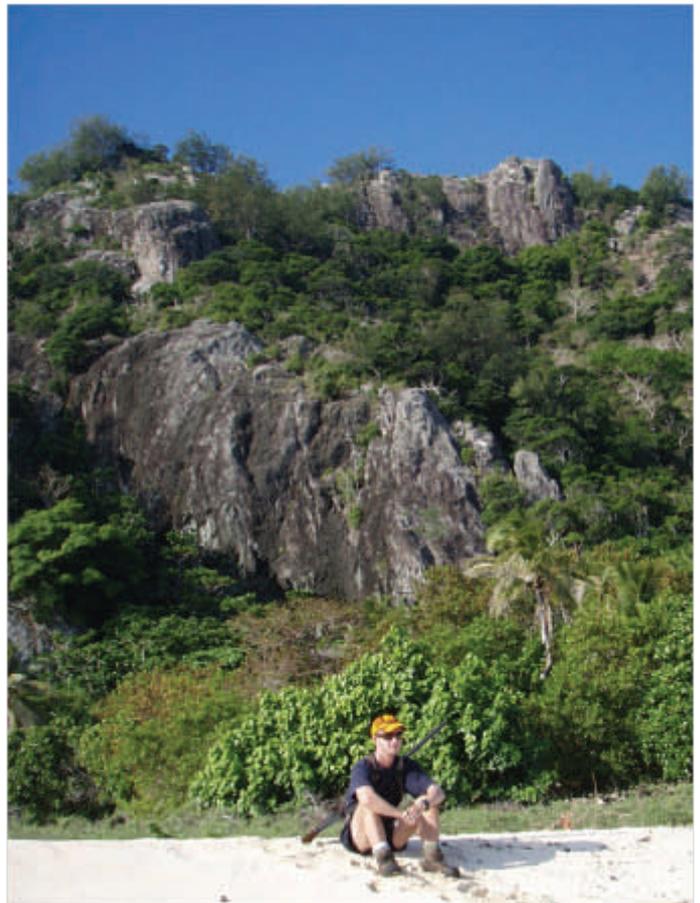
PROJECT UPDATES

Fiji: Restoration of Monuriki and Kadomo Islands - From Luke Robertson, professional hunter, Whangarei, New Zealand

After months filled with the highs and lows of preparing for an unusual job using firearms and dogs and with perceptions of complicated political issues, our toes finally hit the white sand beach. Ross Wharfe and I had reached our destination at last. Our trained hunting dogs had left a few weeks earlier to clear Fiji quarantine and our focus now was to get the project underway. This was where our skills lay and the pressures of the last months melted away in the face of the challenge in front of us.

We were working with a team from the National Trust of Fiji (NTF) and BirdLife International's Fiji Programme (BLF). Monuriki, a small island in Fiji's Mamanuca group is home to the Critically Endangered Fijian Crested Iguana (*Brachylophus vitiensis*) and it and neighbouring Kadomo Island also provide habitat for nationally significant and threatened breeding colonies of Wedge-tailed Shearwater (*Puffinus pacificus*). Both islands have been severely degraded by feral goats and it was our job to remove the goats left behind after the community of Yanuya had mustered the islands.

My first impression of Monuriki was concerning. The photos and study I had done prior to arrival did not do justice to the vertical and craggy nature of the terrain. The main concern was being able to hunt the whole island and access the many guts and fissures between the very large cliffs. Of course we were now in our element, as this is what we do as professional hunters, and within three days we had mapped access to almost every part. By day five, not only did we know all routes, we had covered the area multiple times.



Ridge to reef: Luke Robertson on the beach with some of the rugged terrain of Monuriki Island in the background. (Photo: Ross Wharfe)

FIJI: Restoration of Monuriki and Kadomo Islands —Continued from page 4

We had been led to believe that very few goats remained on Monuriki, but didn't take that too seriously, as feral animal populations can be notoriously hard to count on rough ground. On arrival we immediately removed six before dark. A long next day of ten hours, resulted in the tally rising to twenty-six. The following day a further twenty-four, so we were already at 56, more than five times the estimate.

Our tally of goats peaked around the fourth day then rapidly dived. We went out in a boat brought over from the village of Yanuya so that we could see into a couple of cliffs that were inaccessible on foot. The dogs had scented animals there but it was too dangerous to venture close. The eagle-eyed boat crew showed us the missing animals and we began a hunt for each individual, targeting them over a further couple of days.

At this point we continued using the boat, stalking, viewing and trying any number of tricks-of-the-trade to find out if any goats were left. We could not, and would not allow our dogs to, chase on this island because of the steep cliffs. The goats had been exposed to chase dogs for generations (local dogs were used this way to harvest animals), but we were using ours as indicator dogs that sniff the wind for the scent of goats. After a few days nothing was seen or scented so we moved to Kadomo.

Although a neighbour, this island is poles apart from Monuriki. Monuriki juts to the heavens at many points, with flora and fauna clinging desperately to its slopes. Kadomo is much lower with a single ridge splitting the island in two. One side being steep crumbly rock (a danger for the unwary climber) while the other side is covered in deep grass and spiky bushes, all interlinked by vines. The grass is up to eight feet high and created quite a barrier to hunting.

Luckily the Mataqali had recently taken 16 goats off and believed there to be only four left. The first night we removed six, with one escaping into the deep brush, so next morning one of the dogs was used to chase the animal out and it was targeted. With the easier contours of Kadomo, we used the dogs as chase animals in case other goats remained hidden from view, but soon realised that we had done a good job. We did this for a few more days with no result and the dogs quickly lost interest as the island was covered again and again without any sight or scent of goats.

We then returned to check Monuriki. No goats were located after the few days' break which gave a six day period of no animals or sign seen. The difference along the beaches was already amazing. When we arrived there were no young coconut palms, not a single coconut under the 6m mark and fallen coconuts had their shoots chewed right to the husk (see image on right. Photo: Glen Couston). Not one was growing. By the time we left, all of the coconuts lying on the ground had 20-30cm shoots reaching up for the sun and on the slopes above the beach many other seedlings had sprouted and were growing prolifically.



A Critically Endangered Fijian Crested Iguana, one of the beneficiaries of the eradication of goats from Monuriki Island, Fiji. (Photo: Ross Wharfe)

Some interesting issues for us to deal with were the multitude of large spiders, the sickeningly steep cliffs and the oppressive heat. The latter requiring care and attention as carrying large amounts of water for dog and hunter, made us hotter and the climbing even more risky. On the nature side we found some beautiful birds; Monuriki had a resident Peregrine falcon (possibly two), two Fijian Goshawks, many other native birds and barn owls. Seeing the falcon in a stoop was a highlight for us but maybe not for its victim.

The ground was covered in many thousands of blue-tailed skinks and a green tree skink was also sighted. Working so high above the ocean gave us a marine vista of schools of fish, sleek reef sharks and turtles and up close, the sea showed life unusual to New Zealand in the form of sea snakes and many moray eels living out on the rocks and in rock pools. The job ended with a wonderful find. A female Crested Iguana caught on the second-to-last day was removed to the breeding programme on the mainland and will be the eighteenth to enter the programme.



FIJI: Restoration of Monuriki and Kadomo Islands —Continued from page 5

As the ones covering the ground, Ross and I are confident but wary of saying the job is done. I think that the hard work of NTF, BLF and PII will be justified and appreciated as this project unfolds. We are now back in New Zealand and wait with bated breath to hear if any goat is seen. Every day, sharp local eyes watch the island from boats and from the shore. The potential for dealing with any rogues has been planned and budgeted for with a helicopter search and second hunting period of up to twenty days if necessary. Time will tell on this front.

A big 'thankyou' should go out for the work of so many from the National Trust of Fiji, BirdLife International, the people of Yanuya village and PII. Numerous officials in New Zealand and Fiji also worked to make this operation possible. Our dealings with Jone Niukula (NTF), Sia Rasalato and Steve Cranwell (BLF), Bill Nagle (PII) and Glen Coulston (NZ Department of Conservation adviser to PII) provided us with all the assistance necessary. **(And from PII – a special thanks to Luke and Ross for their commitment to this important project!)**



Trained New Zealand hunting dogs, Kawa and Patch, with a new friend from Yanuya village. (Photo: Ross Wharfe)



Ross Wharfe searching Kadomo Island for any remaining feral goats. (Photo: Luke Robertson)

New Caledonia— From Julien Baudat-Franceschi, Societe Caledonienne d'Ornithologie (SCO)

I'm just back from the field and can confirm that the rodent baiting done in 2008 on Tiam'bouène, Table and Double islands is all successful, there are no more rats on those islands! Changes are already visible on each islet and outcomes in terms of the objectives targeted for seabirds' preservation are:

Ecosystem changes: new bird species never recorded up to now are (re)colonizing the islets with Red-bellied fruit dove (*Ptilonopus greyii*) on Tiam'bouène, Long-tailed triller (*Lalage leucopyga*, an endemic sub species), on Double and on Table, Buff-banded rail (*Gallirallus philippensis swidenllsi*, an endemic sub species) and Tahiti petrel (*Pseudobulweria rostrata trouessarti*, an endemic sub species - IUCN VU). This last species is one of the targeted seabirds for the Packard-funded project with BirdLife International.

I found a singer and its burrow, it is the first confirmation of the occurrence of this species on Table. And we can say that Table Island is now one of the only known rat-free breeding sites for this seabird. We now hope that its presence will contribute to attracting the Polynesian storm petrel back on the island.

Seabird outcomes: Fairy tern (*Sternula nereis exsul* - IUCN VU) has more rat-free island to use as breeding sites. The species used Table as a breeding site last year for the first time (as far as we know) and Tiam'bouène this year. It still breeds on Double Island. Thus it is a success for the conservation management of this tern that is one of the most endangered seabirds in New Caledonia. To this must be added the Tahiti petrel on Table.

Management of the vegetation response: a botanical mission will be conducted within coming weeks to monitor vegetation changes, some of which are already obvious. Some native vegetation, notably sand species that help prevent erosion of the islet, is the "good" side of the vegetation response to rat eradication. But some weeds are growing up also, a management concern that we'll have to deal with

I'm happy to share with you all these good news, our common work has been quite useful and I thank PII for its continuing support! It is a good start toward more work, notably this year more islets to be baited and seabird reserves to be created.

New Caledonia — Continued from page 6

Tahiti petrel on Table Island, New Caledonia.
(Photo: Julien Baudat-Franceschi)



Fairy tern on Tiam'bouène Island, New Caledonia. (Photo: Julien Baudat-Franceschi)

Palau: Conservation of endangered species through the removal of invasive mammals in Kayangel State and the ongoing biosecurity of Kayangel's natural and human resources - From Anuradha Gupta, Director of Conservation and Protected Areas, Palau Conservation Society (with input from PCS staff)

Lessons learned:

Introduction and Background

Kayangel, Palau's northernmost state, is a special place. It is Palau's only example of a classic atoll, featuring atoll forest and a community that is reliant on its natural resources. Kayangel's sandy soils are preferred habitat for the Micronesian Megapode (*Megapodius laperouse*), Palau's most endangered bird (IUCN = EN), and Kayangel has Palau's largest population of the bird. The small island of Ngeriungs has been named an Important Bird Area because of its high population of birds and because of the presence of other unique biodiversity on the island (e.g. endemic amphibians). Although the birds are abundant on Kayangel's islands, as ground-nesters they are vulnerable to the impacts of invasive alien predators. It is believed that an explosion of invasive rats in the late 1980s and 1990s contributed to a decrease in the population of the megapode on all islands of Kayangel. Thus, in 2006 the Palau Conservation Society, a full partner to BirdLife International, working in conjunction with a variety of community and technical partners, began efforts to eradicate invasive mammals (rats, mice, and cats) from the four islands of Kayangel

The Kayangel project had to navigate around a number of challenges. One island in Kayangel is inhabited (approximately 50 year-round residents), with homes, buildings, livestock (pigs and chickens), pets (cats and dogs), farms, taro patches, and cultural relics (stone platforms). Eradicating rodents in the presence of humans brought with it concerns over safety (for humans and other non-target species) and efficacy (e.g. the likelihood of success if rats had access to human food sources). Additionally, there was little information about the Micronesian Megapode itself, as no eradication attempts had so far been done in areas where it was present. Thus, keeping the megapodes safe while using traditional eradication methods (the widespread application of rodenticide) became a challenge. Finally, Kayangel is relatively large (160 hectares) compared to many other islands that have had eradication attempts.

Because of these challenges the Kayangel project was not a straightforward project, and faced numerous delays

along the way before the field operation was implemented. However, these delays served a purpose, allowing for more time to write and refine the operational plan, positioning the field portion during a rare time of good weather, and allowing time to build strong community support. More importantly, the project built community support for conservation, and additional benefits from this project have been the submission by Kayangel State of their application to join the Palau Protected Areas Network and their engagement in the management planning process. We have also learned numerous lessons from this project.

Project Accomplishments

Despite the delays, setbacks, and ongoing work, the major components of this project, the rat and cat eradications, were completed. So far, it seems that the operation has worked and there are currently no signs of rats and we are cautiously optimistic that the project was successful, although we are at least a year away from an official declaration of success (pending ongoing monitoring) there have been immediate benefits to agriculture. Even in the first two weeks following the last broadcast, we had reports that crops are already showing less damage. In particular, we have heard that bananas have been harvested without any rat damage and that coconuts collected from the smallest island have been intact and not damaged by rats. The community is excited about being able to replant crops that have long suffered from rat damage, such as corn, tapioca, and cucumbers, and has made plans to have the Palau Community College bring seeds and seedlings to Kayangel. The community is particularly excited about being able to make a signature corn dish (featured at cultural events) that they have not been able to make for about 20 years. So far there have been no reports of non-target losses to birds.

Community involvement was extremely high and positive. We have heard from many direct and indirect sources that the community is extremely happy about the project. Through this project we also saw achievements in terms of protected areas. Kayangel has for a long time been sceptical of the Palau Protected Areas Network (PAN).

Palau: Rodent Eradication —Continued from page 7

However, through the goodwill and the multiple opportunities to discuss conservation in general that this project created, the Kayangel State Government has changed its mind and has already submitted a PAN application for its existing marine protected area. Kayangel has also agreed to protect a new terrestrial area and is participating in management planning for the entire state. Because there were so many project participants (60 Kayangel community members, 4 Kayangel leaders, 6 other technical partners, 8 PCS staff; not including numerous technical advisors), we feel that we have increased capacity for invasive species management significantly. We have already seen the Kayangel community voluntarily take on aspects of biosecurity (such as inspection of incoming boats).

We anticipate that this project will have long-term socio-economic benefits, both from increased agricultural production and from increased tourism. Several tour agents have expressed interest in visiting Ngeriungs island now that it is free of rats.

Lessons learned

We were fortunate to have a number of conditions in place that contributed to the success of the project. We have analyzed what went right and what went wrong, and feel that we have learned a number of lessons from this project.

- 1. The importance of the community** – This project relied on community cooperation and would not have succeeded without it. As part of this project we had to access every piece of land on Kayangel repeatedly. Community members had to grant us access to their land (Kayangel is 100% privately owned) and had to allow us to cut vegetation on transect lines, place bait, and conduct trapping on their land. Additionally, the chance of success was raised because community members cleaned their homes and removed food sources. Of critical importance was community labor – with a total of 885 person-days spent on the field operations between March and September alone, there is no way that PCS alone could have done the work. The community will also be crucial to long-term biosecurity, as PCS cannot remain in Kayangel and it will be up to them to keep rats from being re-introduced. General community support was also important in keeping up morale and in making for better working conditions when field work was particularly hard or dragged on. The community often expressed its happiness to see this project being implemented and this was important for keeping the group cohesive and involved.
- 2. The importance of paying for time** – Although the community wanted the project, the reality was that the amount of work needed was beyond the usual weekend community service event. Thus, we believe that our decision to provide monetary compensation (in the form of a food stipend of \$15/day (equivalent to 75% of minimum wage)) was crucial to the success of the project. Kayangel is employment-limited and so the money was attractive to many project participants, and kept them involved in the day-after-day hard labor.
- 3. The importance of addressing money issues** – Because we paid people for their time, and because we introduced other funding sources (by purchasing items on island, renting space and vehicles, etc.) and left equipment on the island (machetes, wheelbarrows), we noticed that we had to be very careful about perceptions of money and who was benefitting from the project. Several relationships had to be carefully managed to ensure that jealousy did not hinder the project. We handled all monetary problems at the highest levels (Executive Directors or Project Manager) on a one-on-one basis. We also found it important to keep all monetary issues in-house rather than to delegate to non-PCS personnel.
- 4. Adequate and flexible funding** – We were fortunate to have three generous sources of cofinance for this project, which meant that we could support all aspects of the project. Additionally, funding had to be extremely flexible. For instance, we ended up spending much more money on bait than we had budgeted for, and our donors allowed us the flexibility to do this. Additionally, we had many last minute small purchases, and the ability of PCS's finance department to allow for cash transactions was critical to our success. This was done by increasing the office's petty cash, allowing Project Managers to have an "emergency cash fund", enabling conversion of funds from one budgetline to another, and a change in PCS policy (made outside of this project) to allow for only one signature on checks with an amount of \$500 or less. Cash was available in both Kayangel and Koror, which also helped the project. Early during the field operation we made a mistake by having as many as four people working with cash transactions, which led to confusion. In the end we limited it to two people with responsibility for cash transactions and this worked well.
- 5. This project was expensive and needed access to cash** – In 2011 PCS was in a strong financial position and had access to cash reserves even when payments from donors were delayed (one payment was delayed five months during the field implementation period). We consider this to be a pre-requisite for any future projects – the organization must have enough cash to cover the project, even if from other sources, without being financially hurt.



Some of the implementing team arrive for work on the rodent and cat eradication project led by the Palau Conservation Society on Kayangel Atoll, Palau. (Photo: S. Cranwell)

Palau: Rodent Eradication —Continued from page 8

6. **A Project Manager who was seen as a clear leader and had financial and personnel authority** – The Project Manager was a visible and clear leader, and there was no confusion over who the project leader was on all aspects of the project. This was made possible by the trust and delegation of authority by the PCS Executive Director to the Project Manager. This authority extended to authority over the budget – the Project Manager had the authority to spend money as needed (all large purchases went through review processes). There was no confusion over authority which helped this project. In addition to a clear Project Leader, there was also a clear project supervision structure. There were leaders for the hand broadcast and the bait station operations. There was also a clear community supervisor/leader who led operations when PCS staff were not on island. This helped project participants know exactly who to go to with problems and for directions. It may have helped that the Project Manager also had authority over PCS personnel actions and used that authority to encourage project participants to maintain good behavior.
7. **A Project Manager who could always be found** – In the early stages of preparation, the Project Manager joined teams and participated in field work. There were many times that other project participants needed to find the Project Manager for directions, and wasted time trying to find the Project Manager who was down a transect line. Thus, in later stages, the Project Manager established a consistent location or was centrally located. The eventual purchase of walkie talkies and use of cell phones also helped project supervisors be found.
8. **Flexible PCS staff schedules and supportive Program Directors** – Over half of PCS's staff participated in field operations, from all four programs. The ability and willingness of PCS staff to participate in the project, even when outside of normal duties, and the flexibility of Program Directors to allow their staff to participate, contributed to project success. The flexibility of PCS staff to participate was also made possible by the PCS Executive Director, who stressed that this project was a priority for PCS as an organization (and not just for the Conservation Program or for individual staff).
9. **Access to multiple technical advisors** – PCS worked with technical advisors with multiple perspectives. This was not part of the original project plan which originally included only South Pacific advisors (PII, PILN, BirdLife) in the project advisory group. However, because of links to US Agencies, PCS was able to establish an advisory relationship with the USDA NWRC, which leads eradication efforts in the US Pacific Islands. The USDA NWRC introduced PCS to the possibility of using diphacinone bait instead of focusing exclusively on the use of brodifacoum, which was recommended in the Kayangel Atoll Feasibility Study and which was preferred by the South Pacific advisors. Although it was difficult to manage these conflicting opinions between technical advisors, the fact that PCS had access to different technical advice was important to the success of the project. It appears that the operation has been successful on the smaller islands where megapodes are present in high numbers – using diphacinone and with no reported non-target losses so far.
10. **The importance of separating technical advisors from funders** – PCS faced challenges because its chief link to donors (BirdLife) was also its chief technical advisor. We were often worried that if we disagreed with BirdLife on technical aspects of the project, it would hurt our finances.
11. **A strong and supportive Executive Director** – Although the Executive Director allowed the Project Manager authority over the project, he played a key role in supporting the project (in addition to allowing for staff and funds flexibility). The Executive Director played a key political role, keeping Kayangel's leaders constantly informed and stepping in when high level political assistance or negotiating was necessary. The Executive Director was always well-informed on all aspects of the project, enough so that he could answer questions directly.
12. **A long and adequate planning period** – If the project had followed the original schedule, the operational plan would have been rushed and might not have been as easy to follow or as clear as it was. The unanticipated project delays helped with this. Given the need for capacity building in the Project Manager, the original schedule of one year for project planning would not have been adequate. Project planning went on for almost two years.
13. **Office-based staff understood the plan and the process** – Even those staff who did not participate directly in the field operations supported the project and assisted with procurement of goods in Koror. The Project Manager made a point of briefing all staff on the project during staff meetings (for several months) and sharing the operational plan with many staff, so that office-based staff could support the project fully without confusion.



Transect lines for hand-baiting were cut through the vegetation on Kayangel Atoll, Palau (Photo: Alan Saunders)

Palau: Rodent Eradication —Continued from page 9

- 14 The importance of spending money on staff/participant morale and comfort** – We asked PCS staff to relocate to Kayangel and leave their families and homes for weeks on end, live in a large group, and perform hard daily labor. We kept staff morale up by spending money on an expensive residence (with air conditioning and television), special foods, and other group needs, allowing for days off, providing \$15/day per diems, providing eight hours of compensation time for each overnight, and running boats back and forth to Koror on a regular basis. On particularly hot or rough days we bought sodas or candy for all project participants and took breaks in the work. We regularly thanked people for their assistance.
- 15 The importance of separating components as much as possible** – We made a mistake in placing the cat spay and neuter clinic at the very end of the broadcast, without allowing for any rest time between the hand broadcast and the clinic. PCS staff were preoccupied (and tired) and were not able to help the Koror State Animal Shelter personnel to their fullest. If we had waited one week, we likely could have still capitalized on the community momentum while allowing PCS staff some time to rest and recover.
- 16 Communication was key to success** – Kayangel was close enough to allow for regular communication during the field component. Additionally, all PCS staff and project participants, and the community and Kayangel leaders, were regularly involved in briefings and community meetings. In the end project participants in Kayangel and Koror felt that they understood the project plan and the rationale behind the plan. We also had daily communications between Kayangel and Koror, even when not necessary. We consider having a good communication system a prerequisite for any future eradication efforts.
- 17 Allowing the community to participate in decision-making** – During project planning we left some decisions up to the community – such as whether to do a hand broadcast around homes and how to treat culturally taboo areas – and this built community ownership and support. Community meetings were interactive rather than unidirectional.
- 18 After it all, there are those who didn't understand the full implications of the project and why we were doing it** – We found that some of the poison bait had been stolen and taken for use off-island by someone who thought he could eradicate rats around his home. This tells us that despite our outreach, there were those who did not fully understand the project and the science behind it. This tells us that we have to remain more involved in biosecurity, rather than relying on the community to fully implement biosecurity.
- (PII congratulates PCS on completing a very demanding work schedule and looks forward to PCS announcing positive conservation outcomes)**



Members of the baiting team during the rodent and cat eradication project led by the Palau Conservation Society on Kayangel Atoll, Palau. (Photo: PCS Staff)

REGIONAL INTEREST

New 'Managing animal pests' section of the New Zealand Department of Conservation website

Most DOC Animal Pests Standard Operating Procedures (SOPs) and an abridged status list of vertebrate toxicants are now available on the DOC website at: <http://www.doc.govt.nz/publications/science-and-technical/doc-procedures-and-sops/managing-animal-pests/>. This section of the DOC website also has performance standards sheets. Warning signs templates will be migrated next (by November) and the DOC Pesticide Information Reviews will be available on the DOC website by the end of the year. This material is written specifically for New Zealand but has much of interest to invasive species practitioners.

A recent reference:

The September issue of *Diversity and Distributions: A Journal of Conservation Biogeography* (Volume 17, Issue 5 Page 771-1075, September 2011. <http://onlinelibrary.wiley.com/doi/10.1111/ddi.2011.17.issue-5/issuetoc>) is a special issue on invasive Australian acacia species. The special issue comprehensively treats, in over 20 articles, biological and cultural aspects of invasive acacias and covers management issues. Acacia species are already invasive on many islands and are still regularly introduced to islands and thus represent one of the major emerging plant invasion threats on islands.

Funding information—Terra Viva Grants Directory

The Terra Viva Grants Directory provides information about international grant funding for agriculture, energy, environment, and natural resources in the developing world. It focus on grant makers (donors) serving the developing world. "Most of the world's population is there, but most of the world's funding is not" The Pacific Islands are included in the directory.

For more information visit: <http://www.terravivagrants.org/Home/funding-news/biodiversity-conservation-wildlife>

EXPERT OPINION

Invasive ants in the Pacific – From Disna Gunawardana, Plant Health and Environment Laboratory, Ministry of Agriculture and Forestry, New Zealand

Ants are the most ecologically successful species, occupy most terrestrial habitats and perform key functional roles as; predators, herbivores, scavengers, seed eaters and seed dispersers. There are at least 15,000 species worldwide and some of them are notorious invaders. They can nest almost anywhere, move nests frequently, and consume a broad range of foods.

Their effects on society are many, quite apart from their nuisance value when populations reach high numbers. They sting people, infest electrical equipment and cause damage to crops in many different ways. They can reduce biodiversity among other invertebrates and reptiles and cause outbreaks of sap sucking insects.

The globalisation of trade and commerce provides many pathways for ant dispersal: fresh produce, nursery plants, containers, household equipment, passengers. The two main perpetrators both originated in South America, and are now in the midst of a massive invasion campaign across the Pacific. The Red Imported Fire Ant (RIFA - *Solenopsis invicta*,) and the Little Fire Ant (LFA - *Wasmannia auropunctata*,) cause devastating damage wherever they colonize by delivering painful stings to humans, compromising food security and causing local extinctions of native species. Adding to their menace, once these noxious insects establish viable populations in a new region, eradication is often prohibitively difficult.

The Red Imported Fire Ant (*Solenopsis invicta*), is widespread in the southern United States and it has been introduced to Australia, Hong Kong, China, Malaysia, Singapore, Taiwan, and Bahamas. It has also been found in New Zealand but has been successfully eradicated. The Little Fire Ant (*Wasmannia auropunctata*) has recently been detected in Queensland, Australia and is present in many Pacific countries; French Polynesia, Galapagos Islands, Hawaii, New Caledonia, Papua New Guinea, Solomon Islands, Vanuatu, Wallis and Futuna.

Early detection is the key for successful eradication of any exotic species. It is vital that practitioners in the Pacific are able to recognise these high-impact invasive ants, or know where to go for identification services, in order to facilitate the eradication of new detections and the prevention of further spread where they are present. See below for information on **Ant Surveillance Methods**, which is also available on the PII website (<http://pacificinvasivesinitiative.org/pii/index.html>)

Entomologists from a number of Pacific countries have received training in invasive ant identification skills. The Secretariat of the Pacific Community (SPC) hold all materials used in a recent training workshop and can be contacted for information about contacts for ant identification. Attached to this newsletter and available from the PII website (<http://pacificinvasivesinitiative.org/pii/index.html>) is an information sheet for preparing samples for identification.

Useful references and web sites for Ant Identification

- Anderson, A. N. The ants of Northern Australia. A guide to the monsoonal fauna. CSIRO publishing. pp 106.
 Bolton. B.1994. Identification guide to the Ant genera of the world. Harvard University press. Pp 222
 Shattuck, S.O. 1999. Australian ants: Their biology and identification. Monographs on Invertebrate Taxonomy. Pp 226
 Wilson, E.O. & Taylor, R.W., 1967. The ants of Polynesia (Hymenoptera: Formicidae). Pacific Insects Monograph 14. pp.109
 Sarnat, E.D, 2008. Identification guide to invasive ants of the pacific islands. <http://keys.lucidcentral.org/keys/v3/PIAkey/index.html>
www.piakey.com.
 Ants of New Zealand. <http://www.landcareresearch.co.nz/research/biocons/invertebrates/ants/key/>
 Australian ants on line. <http://www.ento.csiro.au/science/ants/default.htm>
 Global Invasive species database <http://www.issg.org/database/welcome/>
 AntWeb. Ants of the world. <http://www.antweb.org/>



The Little Fire Ant (LFA, *Wasmannia auropunctata*) above and the Red Imported Fire Ant (RIFA, *Solenopsis invicta*) below – not to scale. (Images: Eli Sarnat)



Ant Surveillance Methods: Prepared for the PII Island Biosecurity Training Course by: Disna Gunawardana, Plant Health and Environment Laboratory, Ministry of Agriculture and Forestry, Auckland, New Zealand.

Ant surveillance needs to be conducted both visually and using attractant baits

1. **Visual Surveillance:** Visual Surveillance is conducted over the entire surveillance area, regardless of presence of ant habitat, by walking systematically over the area looking for ants. Where debris is present and easily moved, the item/s should be shifted to facilitate the inspection. Any suspect ants found should be collected and identified. Always label the ant sample as a visual sample, and the locations need to be marked on the ground and recorded on a map or survey form that indicates the area where they were found so that the site could be re-visited for further investigation.

2. **Attractant Bait Surveillance** Attractant Bait Surveillance need occur only in favoured ant habitats (see below for list). Both protein-based baits and sugar baits should be used. Baits can be prepared and laid in small plastic pots (jars). When the baits are collected the lid is replaced and any ants recruiting to the bait are trapped inside. Density of bait placement is based on a minimum of two baits per equivalent of a 15 m × 15 m grid (225 m²). Separate protein and sugar based baits must be composed and laid as follows:

(a) **Protein-based bait composition.** Prepare protein bait by smearing a line of blended peanut butter and soybean oil (the size of half a pea), and a line of raw, fatty sausage meat to the inner side of each bait container, maintaining a 1 cm gap between the two smears. (If predicted temperatures are greater than 25°C, ensure a larger quantity of sausage meat is applied to prevent bait drying out).

OR

Canned tuna could be used if the above ingredients are not available. (Simple method)

(b) **Sugar-based bait composition.** Prepare a sugar based bait pot by placing a small plug of cotton wool (approx. one third of cotton ball) soaked in 30% sugar solution inside of each container

OR

Smear light coloured jam inside the pot.

(c) Only fresh baits are to be used to ensure consistent attractiveness to foraging ants.

Bait pot placement is to be implemented as follows:

- Bait pots need only be laid in areas of favoured ant habitat. Where there is no favourable ant habitat in a 15 m × 15 m grid, no baits need be placed;
- Where favourable ant habitat is found, at least one protein-based and one sugar-based bait pot must be placed in the 15 m x 15 m grid;
- The bait pots are to be placed 10 m apart where possible. A minimum of 1m between bait pots must be met at all times. Spacing between protein and sugar bait pots should be at least 1m apart.
- All bait pots laid must be able to be traced back to place of location, in case of an exotic ant detection where the area needs to be investigated;

Environmental conditions

- Both visual and attractant bait surveillance can only be conducted when the air temperature is consistently at mid 20°C and below 36°C (measured in a sheltered and shady position) with little or no wind.
- Bait pots shall be placed in the shade where practicable. Surveillance should not occur during or after rain while the sealed surface is still wet. Also no rain should occur between placement of bait traps and their retrieval.
- Bait pots must be collected at or close to 1/2 hour following placement to prevent baits drying out. However if large numbers are recruiting to baits, reduce the time the bait is exposed to the ants to 20min, 15min or 10min., or alternatively consider doubling quantity of bait in each pot.

Label Format for collected ant specimens

Site name, where collected, collector: initials and surname

Date collected: month spelt out and year in full

Solomon Islands Henderson, Honiara Mango tree trunk RU Lokal 30 September 2011
--

Favoured Ant habitats

The list of favoured habitats is long and should serve as a check list to reinforce habitat preference principles.

1	Tree trunks (visual inspection and bait at base if appropriate).
2	Flowers.
3	Shrubs and poles.
4	Building edges and foundations.
5	Hard seal (concrete/asphalt) slab edges.
6	Cracked concrete/asphalt and junctions between pavers
7	Disturbed sites.
8	Drains and culverts.
9	Electrical generators and fittings.
10	Exposed rocks.
11	Fence palings.
12	Grass areas.
13	Verges.
14	Hot water pipes and heaters.
15	Isolated weeds.
16	Logs.
17	Loose gravel.
18	Low vegetation (including grass).
19	Plant pot bases.
20	Road margins.
21	Rubbish piles.
22	Shiny/corrugated surfaces.
23	Soil.
24	Tree crotches and hollows.
25	Vertical surfaces.
26	Weed and plant re-growth.
27	Wooden structures.
28	Underneath stones, concrete rubble, timber and debris

Yellow Crazy Ant Eradications in NE Arnhem Land Australia – From Ben Hoffman CSIRO, Australia

I'm happy to announce that we have declared yellow crazy ant (*Anoplolepis gracilipes*) eradicated from another five sites, covering 22.4 ha in NE Arnhem Land, Australia. This brings the total number of sites fully assessed and the ant declared eradicated, to 26 covering 77.4 ha.

These sites were of particular importance, because they were either nearby to isolated populations of the Threatened Gove crow butterfly, or were part of trials assessing the efficacy of an Insect Growth Regulator. In a nutshell,

these results further demonstrate the efficacy of the triple-treatment regime used in this program, and more importantly we are not dependent upon using only toxic products.

For those curious about non-target impacts within this program, there are no species of concern, and monitoring has shown over and over again that there is a complete recovery of the native ant fauna within 12 months (one breeding period). Indeed the impacts of yellow crazy ant are greater than the baiting program.

Pacific Island Rodent morphology dataset – From James Russell, University of Auckland

Knowledge of how body-size changes with island latitude (and other factors such as island size, elevation and other mammals present) can be used for improving conservation by estimating what plant and animal species may be at greater risk of predation (e.g. by bigger rats). Hawaiian and New Zealand researchers have joined forces to investigate the body-size of introduced rats and mice across the entire Pacific.

Ecological theory predicts the body-size of a species will differ depending on their latitude, and the introduced rodents on Pacific Islands are a perfect dataset to test this theory. Currently readers have donated data from across the Pacific – including Micronesia to Mexico and Hawaii to subAntarctica. We are still looking for more datasets to analyse however, especially if you know of any rat body-size data (species, gender, weight and body length) from the following islands: Tonga, Samoa, American Samoa, Tuvalu, Vanuatu, Nauru, Marshall Islands, the Solomons, Gilbert Islands at the equator.

If you know of any datasets from the islands or anyone trapping rats there please contact Dr. Aaron Shiels (ashiels@hawaii.edu) who can provide you with more information on the study. The results will eventually be reported on in a future issue of the PII newsletter.



Collecting rat morphology data on Pohnpei, Federated States of Micronesia (Photo: Natasha Doherty)

Tricky Terminology: 'Invasive Alien Species' or 'Pest' and 'Weeds' (Part 2) – From Shyama Pagad, Manager, Information Services, IUCN SSC Invasive Species Specialist Group, Regional Pacific Office, University of Auckland, New Zealand. Feedback on this article is welcomed (s.pagad@auckland.ac.nz)

Often wonder which term to use when talking about invasive species and their management? In Part 1 of Tricky Terminology, I looked at definitions and in Part 2, I examine how the ISSG uses these terms in classification of species in invasive species work.

The Invasive Species Specialist Group (ISSG) is one of five Disciplinary Groups of the Species Survival Commission (SSC) of the International Union for Conservation of Nature (IUCN). It aims to reduce threats to natural ecosystems and the native species they contain by increasing awareness of biological invasions and of ways to prevent the introduction of or eradicate or control invasive species. It promotes and facilitates the exchange of invasive species information and knowledge across the globe ensuring the linkage between knowledge, practice and policy so that decision making is informed.

The ISSG developed, manages and maintains the [Global Invasive Species Database \(GISD\)](#) an online, freely available premier resource of information on invasive species, their ecology, spread, management and impacts presented as species profiles. The GISD focuses on invasive species that threaten native biodiversity and covers all taxonomic groups from micro-organisms to animals and plants in all ecosystems.

Use of species terminology in the GISD and work of the ISSG

The GISD uses the following descriptors to describe the biological status of a species in a particular location

Tricky Terminology - Continued from page 13

Species Occurrence	Species Provenance/Status	Species Invasiveness
Absent	Alien	Invasive
Recorded in Error	Native	Not Invasive
Reported	Native- Endemic	Invasiveness Not Specified
Established	Native- non Endemic	Uncertain/Not known
Established and Expanding	Cryptogenic	
Established and Stable	Uncertain	
Reported as captive/cultivated		
Sometimes present		
Present/Controlled		
Extinct		
Eradicated		
Eradication unconfirmed		
Uncertain		
Intercepted		

The content of the GISD is collated from reliable sources of information that include other National, Regional, Thematic databases, scientific literature, reports from species experts, practitioners etc. **The descriptor of the species biological status is recorded as it is from the source information.** However, the ISSG is sometimes required to make an interpretation of the status depending on the information available. For example if there is a study which describes the impact of an alien species on natural ecosystems or the native biodiversity they contain we record the species as 'invasive' even if the study does not describe it as such.

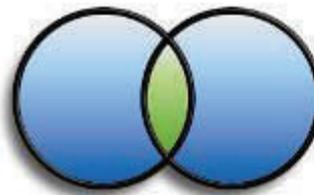
In cases of its **(ISSGs) own research work**, for example

in the analysis of invasive species indicators and trends, the criteria used to classify a species as 'invasive' is based on evidence of impacts and or invasive traits such as 'aggressive spread' exhibited by the species in question at a country/location. An alien or introduced species that does fit into the above criteria in a particular country/location is thus classified simply as 'alien' 'invasiveness not specified' or 'potentially invasive' in cases where the species in question has exhibited invasive traits or impacts elsewhere in its introduced range.

Part 3 will describe the development and use of standard universal terminology in invasive species related informatics.

University Of Auckland,
Tamaki Innovation Campus,
Private Bag 92019,
Auckland 1142,
New Zealand.

Phone: (+649) 923 - 6805
Fax: (+649) 373 - 7042
E-mail: pii@auckland.ac.nz
URL: <http://pacificinvasivesinitiative.org/pii/index.html>
Find us on Facebook



**Pacific
INVASIVES
INITIATIVE**

Ant Specimen Preparation Techniques for Identification

Prepared by: Disna Gunawardana, Plant Health and Environment Laboratory, MAF Biosecurity, Auckland, New Zealand and Eli Sarnat, University of California, Davis, USA.

For short term storage, ants can be placed in 70-75% ethyl alcohol. If ants are to be used in molecular tests, those specimens should be stored in 95% ethyl alcohol.

For detailed study and long-term storage, ants should be point-mounted on insect pins. Pointing allows specimens to be easily manipulated while being examined with a microscope and is essential for viewing fine details such as sculpturing and pilosity. In all cases, ants, even large species, should be placed on points and not directly pinned.

Pinning of specimens:

- Individual points can be either hand-cut from strips of stiff, white, acid-free paper, or punched with a specially designed hand-punch or purchased from Entomological suppliers.
- The glue used to attach ants to the points should be water-soluble to allow for later removal if needed.
- Stainless steel insect pins of size 3 can be used to hold the points.
- Individual ants should be glued to the tip of the point with just enough glue to hold them securely but not so much that the lateral or upper surfaces are obscured.
- Specimens should be mounted upright, horizontal and with the point extending from the ant's right side.
- Place the ant at the very tip of the point with the point covering the first segment of the middle and hind legs nearest the body.
- Try to (very) gently pull the legs downward so that the outer surface of the body can be seen in side view.

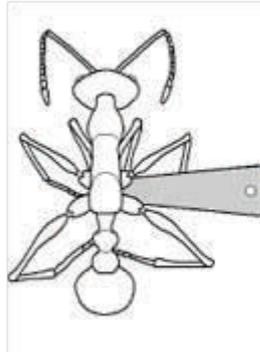


Fig.1: Top view of an ant mounted on a triangular point

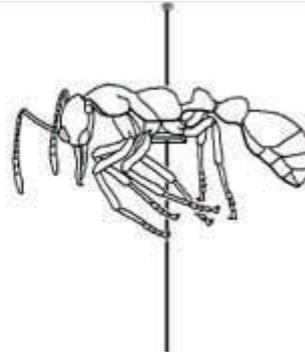


Fig.2: Side view of an ant mounted on a triangular point

(Figures taken from: Shattuck, S.O. 1999. Australian ants: Their biology and identification. Monographs on Invertebrate Taxonomy. p17)

Labelling

Once the specimens are properly mounted, the final step is to add labels. Labels should be the standard type used in entomology 12mm X 8mm.

Label should include as a minimum;

- Location (Country and nearest named place)
- Date
- Collector's name

Additional information which should be included if available includes: the latitude, longitude and elevation of the collection site, a brief description of the habitat.

New Zealand, AK, Mt Eden,
100m SW One Tree Hill
37030'S 144013'E , On apple leaves
21 Mar 2007
S.H. Anthony

Fig.3. Locality label - placed below the ant on the same pin.

FORMICIDAE

Solenopsis invicta

Det. J. Brown 2007

Fig. 4. Determination label – placed below the locality label.

References:

Shattuck, S.O. 1999. Australian Ants: Their biology and identification. Monographs on Invertebrate Taxonomy. Pp 226.

Walker, A.K. & Crosby, T. K., 1988. The preparation and curation of insects. DSIR Information Series 163. Wellington. Pp.91.

