Challenging the yellow crazy ant, *Anoplolepis gracilipes*, on Tokelau; development and implementation of control options for invasive ants

(a project supported by the Pacific Invasives Initiative)

Report of an awareness and training programme; April-June, 2006

Prepared for: School of Biological Sciences, Victoria University of Wellington, New Zealand

Prepared by: Kirsti Abbott Ph.D.

Funded by: Critical Ecosystem Partnership Fund.
This project is funded through support to CEPF from the Australian Government's Regional Natural Heritage Program. CEPF is a joint initiative of Conservation International, the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank.

Challenging the yellow crazy ant, *Anoplolepis gracilipes*, on Tokelau; development and implementation of control options for invasive ants – an awareness and training programme, April-June, 2006.

Introduction – If this project has taught us one valuable lesson, and of course it is not a new observation, it is that it is absolutely imperative that Pacific Islanders take responsibility for the preservation of their unique environment. It is what defines the Islands, their cultures and the people themselves. An abundant, intact environment provided for the first people to inhabit the Islands. That this same ecosystem will sustain the lifestyle and standard of living that Islanders desire is not guaranteed. In fact, invasive species alone are threatening agriculture and the subsistence lifestyle on many islands already.

Too many students are studying business, marketing and computer science. Too many Islanders put their faith and hope in a market economy without the understanding that without natural resources, it is futile. The future of these islands lies in young people understanding the complex web of biological life. In some small way, we feel that this project might have inspired a few Tokelauans to think about this more.

These remarks will obviously not assist directly in the review of this report, but we hope they reflect our passion for working in a sustainable manner throughout the Pacific, and commitment to this particular project to ensure positive outcomes.

Implementing agency:
School of Biological Sciences, Victoria University of Wellington, New Zealand

Implementing team:
Kirsti Abbott Ph.D.
Alice McNatty
Suzanne Brangwin
Matthew Adam

Funding Agency:
Critical Ecosystem Partnership Fund; James Atherton, Pacific Grants Manager

Implementation Partners for this project:
Pacific Invasives Initiative, New Zealand
- Bill Nagle; Project Coordinator
- Karen Johns; Community Participation Adviser

FlyBusters/AntiAnts, Auckland, New Zealand
- Cas Vanderwoude, Manager

Pacific Ant Prevention Programme, Secretariat of the Pacific Commission
- Simon O'Connor, Coordinator

The initial objectives of this project

The deliverables stated in the original project document were as follows:

1. Training of local personnel to conduct ant control, monitor ant populations and evaluate success of a control program. This will involve quarantine and environment officers in all aspects and procedures of the operational stage of the baiting on Tokelau, and handing over equipment needed for ongoing monitoring to the future national coordinator of quarantine and environment issues on Tokelau.

2. Coordination of the project with an education and awareness program for local people about maintaining quarantine procedures to prevent crazy ants and other invasive species from re-entering Tokelau, and exploding in numbers. The program includes the production of posters,

conducting workshops and seminars, and actively engaging in the consultation process of how to best meet Tokelau's future needs in this area.

3. In consultation with Tokelau, provide a framework based around contingency plans for future invasive ant explosions. This will include a manual encompassing the technical aspects of a response, including health and safety issues regarding bait distribution, contacts for instigating community responses, and building networks, and acknowledging Tokelau's position in the international biosecurity environment.

Methods used in achieving the objectives of this project

Training

The training module of the program focused on field aspects of bait distribution, health & safety issues of toxic baiting and storage and disposal of excess toxic bait. We conducted "on the job" training for the men appointed by the Taupulega (Council of Elders) to the project. The appointed team was made up of two quarantine officers, four older, more responsible men (some of whom had experience in weed of goat control in NZ), one police officer, and 6 younger men that were expected to carry out much of the more physical work.

During one afternoon on Nukunonu atoll, we assembled in the meetinghouse where I explained about safe handling of the bait and gave everyone disposable latex gloves to wear whilst baiting. We went through the technique of hand baiting with non-toxic bait and all members of the team mastered the throwing out of the bait. We then transferred to the end of the island and started baiting with toxic bait in a search and rescue type sweep arrangement. The two quarantine officers were responsible for managing the team logistics and direction, while the Victoria University project members fine-tuned the technique. We continued until seven hectares had been baited and we were satisfied that the team was competent in distributing the bait after we had left.

Unfortunately, weather dictated that we did not complete the distribution of the toxic bait, so training in monitoring the success of the baiting could not occur during the time we were on the islands.

Again, over one day on Fakaofo atoll, four of the able-bodied work crew and our team assembled in the storage shed where the toxic bait was kept. We taught the men to pack bait in field bags, and then broadcast bait distribution, which was slightly different to Nukunonu atoll. We continued to bait three hectares before leaving the bait with the men.

Education & Awareness

There were five main activities undertaken to increase awareness of yellow crazy ants on Tokelau:

- Taupulega meetings
- School Days (Fig. 1)
- Community Days (Fig. 2)
- Radio Interviews
- Interviews with Environment Officers for writing articles in popular media

The Taupulega meetings were essential in gaining permission for the project to go ahead and to establish the program of the coming weeks. The Council sets village priorities and tasks, so we had to fit in with other events. The Victoria University team provided the Councils on both Fakaofo and Nukunonu atolls with written information on the project, and requests for our program and help from village men for the baiting. All written material was translated, and in meetings an officer translated all verbal communications. Meetings were conducted within the first 5-10 days of being on an atoll, so often our project was delayed because of waiting for permissions.

The school education days were held on both Fakakofo and Nukunonu atolls. The Victoria University team ran classes that spanned one whole day, and taught students from kindergarten (3-4 year olds) up to Form 5 (17-18 year olds) and their teachers about yellow crazy ants. The information taught was tailored to the level of each class, and included aspects of the biology and morphology of ants, colony dynamics, why the yellow crazy ant is a pest on Tokelau, impact of the yellow crazy ant and the control program aimed at reducing the numbers of yellow crazy ants. Students were able to use a microscope (which we later donated to Nukunonu school) to look at ants up close, and we took students outside to learn how to identify ant nests and queen ants.

The Community day was conducted on Nukunonu Atoll only, as there are two inhabited islands on Fakaofo Atoll and it was not feasible to bring the people together, or transport live ants between islands. The community day aimed to increase awareness of the yellow crazy ant problem for all residents, and was conducted over three hours one morning for the women and the men separately. The Victoria University team explained the biology of the ants, colony dynamics, pest dynamics and

the use of the toxic bait to control them. People had the opportunity to ask questions, and questions continued for almost an hour for both groups. Residents has the opportunity to look at live ant colonies, identify queen ants, males and other life stages, and also use the microscope to get a closer look. Many of the people had never looked through a microscope. Written information about the toxic bait was available as well as maps of the planned baiting areas.
Dr Kirsti Abbott was interviewed on Nukunonu radio about the project and the planned baiting. The interview was conducted by Mika Perez, Advisor to the Taupulega on Nukunonu for environmental matters, economic development and natural resources.
Dr Kirsti Abbott also interviewed Mose Pelasio on Fakaofo, the Acting National Director for the environment, economic development and natural resources, and Mika Perez for an article just submitted to Pacific Ecologist on ants as invasive pests in the Pacific region.

Figure 1.

School days on both Fakaofo atoll (red & yellow uniform) and Nukunonu atoll (green & white uniform).

Students from kindergarten through to senior school were able to observe live ant colonies, and learn how ants cooperate. Looking for yellow crazy ant nests outside made all the information leant in the classroom relevant, and students were excellent at finding queen crazy ants!

Figure 2.
Awareness-raising with a community day for both the men and women on Nukunonu Atoll.

Framework for future response
Three technical manuals are currently being developed, after discussions with Tokelau and the baiting of islands on Fakaofo and Nukunonu atolls. They include The Scoping Phase, The Treatment Phase and the Post-Treatment Monitoring phase.
Three actions in particular contributed to material in these manuals: meeting with the Taupulega on each atoll to determine their needs for future ant control; working with the able-bodied men and talking to them about the logistics and practicalities of ant control on their islands; and interviews with the Acting National Director for the Environment, Economic Development and Natural Resources on Fakaofo, and also the Advisor to the Nukunonu Taupulega in the same division.
Further information in these manuals has been compiled from research papers, direct experience on Tokelau and from advice and suggestions by people working in ant control and quarantine in the Pacific region.

The success of the project and the key factors that contributed to that success

The project fulfilled part of each objective. Those parts that were not achieved were primarily due to logistical and practical reasons, and often weather and time were the limiting factors. In fact, time was the most limiting factor for the project as a whole. It is often difficult to measure the success of qualitative projects such as this. However, it was rewarding to see both concrete and intangible outcomes from all three objectives.

Training

1. Since the Victoria University team left Tokelau, the appointed work teams on each atoll have distributed ant bait to a further 22 ha on Fakaofo and almost 12 ha on Nukunonu.
2. We have received positive feedback in emails (see Appendix 1) about the success of the project.
3. The work teams on each atoll have taken responsibility for the storage, disposal and use of the toxic ant bait.

Education & Awareness

1. Teachers in schools on both Fakaofo and Nukunonu atolls instigated science topics about ants or insects in the week following our school days, many of them saying they were inspired by our teaching.
2. Teachers of the kindergarten kids hung up on the classroom walls the crayon drawings of ants that the kids had done at the school day.

3. Senior students wrote essays about what they learnt at the school day, and many of them incorporated new ideas and words demonstrating they had absorbed the majority of the material we taught.
4. Primary school students brought to our house live and dead queen yellow crazy ants detailing stories of how they had captured them, and that they were going to help kill them all!!
5. In days after the school day, parents on both atolls described how their children returned home from the day full of information about ants and how to help control them around the home. Apparently kids were talking about what they'd learnt for weeks afterwards.
6. Older village residents asked questions about how they might protect their pollinators from the effects of the yellow crazy ant, indicating that they had linked impacts by these ants to their fruit and flower production.

Framework for future response

1. Input to the ant control manuals by office managers and advisors was relevant and detailed, and provided specific information for Tokelau that otherwise would not have been included. For example, encouraging the villages on each of Tokelau's three atolls to undertake ant control in a standard manner was of high priority for managers. This was written into the manuals, whereas it might not be for islands whose geography does not include separate atolls.

Achievements:

a) capacity development;

This project has contributed to the limited biosecurity capacity on both Fakaofo and Nukunonu atoll. It has increased the practical capacity for decision-making and action for ant control. The Victoria University team worked with the quarantine officers from each atoll, teaching them methods to quantify ant activity, locate yellow crazy ant nests, and distribute toxic ant bait in high-density infestations in the recommended fashion (Fig. 3).

Previous to this project, Tokelauans relied on liquid insecticides sent from New Zealand to solve their ant problems, which has not worked for the past 5-8 years.

b) developing partnerships;

The partnership between Tokelau and Victoria University is a relatively long one, and as technology develops, is proving to be more successful. Researchers and managers from the university had been involved in rat control in the early 1970's, mosquito research and control around the same time, and the documentation of biological diversity on the atolls. That the yellow crazy ant team were able to continue this partnership was valuable in itself. However, during this project, and in developing the framework for future response to ant invasions, linked Tokelau with the Pacific Ant Prevention Programme (PAPP). This is a new program that aims to coordinate invasive ant prevention, response, research and ongoing control throughout the Pacific, with a primary aim of keeping the red imported fire ant out of the region. It is hoped that the PAPP will provide a supporting and reference role for Tokelau now that Tokelau has the capacity to manage invasive ants. Probably the most important role the PAPP will play for Tokelau is in finding funds to purchase toxic bait from the manufacturers in Australia.

Figure 3.

A) Discussing locations for toxic baiting with the work team on Fakaofo Atoll.

B) Training for field crew in distributing toxic ant baiting the field on Fakaofo Atoll.

C) Tokelau local working alongside Victoria University team member assembling cages for hermit crab research.

D) The baiting team on Nukunonu Atoll, including two quarantine officers.

Our awareness-raising program was hugely successful on both Fakaofo and Nukunonu Atolls. On small, isolated islands such as Tokelau, simply being there, and being approachable, raises awareness of the work we were doing, and in this case it was managing the invasive yellow crazy ant. We were called "The Ant Team" (among other names!), which indicated that at the very least the whole community was aware of what we were doing! In a culture where day-to-day family life is priority, and long-term environmental consequences of pest insects are not usually acknowledged or planned for, it is commonly only people who have had direct experience with the ants themselves who engage in methods to manage them. On Tokelau, residents on one island of Fakaofo atoll, and two islands on Nukunonu atoll had lived with yellow crazy ants in and around their homes, in their beds, on their dinner table and destroying their fruit crops. They were very aware of the impacts of the yellow crazy ant, but not methods for controlling them. The work of the Victoria University ant team increased and broadened resident's knowledge and understanding of the yellow crazy ant's impacts already having a background level of concern there. But what was achieved on top of this was raising awareness of control methods; why off-the-shelf insecticides don't work, why toxic baiting is currently the only effective knock-down for invasive ants; and understanding the development of a specific toxin that has extremely minimal effects on the surrounding environment and non-target organisms.

c) involving the local community and other stakeholders:

Involving the local community and all relevant stakeholders in this project was crucial to sustaining the capacity for controlling invasive ants after we left. The stakeholders in this project included:

- Tokelauan government at all levels, which included officials in Apia and Wellington, as well on each atoll.
- Other regional environmental bodies inc. the South Pacific Regional Environment Program (SPREP), the Secretariat for the Pacific Community (SPC), the Pacific Invasives Initiative (PII), Invasive Species Specialist Group (ISSG), and the Pacific Ant Prevention Programme (PAPP) coordinators.
- Toxic bait manufacturers and distributors in New Zealand and Australia.
- Funding organisations interested in communicating results.

During the majority of planning and implementation stages of this project, we liaised with these organisations, and PII was particularly helpful in planning details of the school days, fact sheets and

general logistics. We aimed to ensure that there was an understanding that invasive species projects are usually long-term, and that there are no quick-fixes. Continual communication with the local community and these stakeholders ensured that as many aspects as possible to the yellow crazy ant invasion on Tokelau, and how they relate to other Pacific islands, were covered in the awareness-raising program. Inclusion of community and stakeholders guarantees a sense of ownership of the project, which is also critical in future responses of this type.

d) providing benefits to the local community and other stakeholders.

The biggest benefit of our project was the development of an option for invasive ant control. Previous to this project, Tokelau had been using a liquid insecticide to control ants around their homes, which had not worked, and will never work due to the nature of the poison and distribution methods. However, this project also generated an increased understanding of how residents could limit the spread and impacts of the yellow crazy ants around their homes, school and hospitals. Distribution of the toxic bait, and giving the work crews the knowledge to do this, will decrease the number of yellow crazy ants on the islands.

Effect of the project at the local and national level

Our project was implemented on a local level, i.e. within the villages on Fakaofo and Nukunonu atolls. The impact of the project at this level included increased awareness of the impacts and consequences of the invasive yellow crazy ant, an option for invasive ant control, and the capacity to implement their own program should any atoll choose to in the future. However, Tokelau is made up of three atolls – Fakaofo, Nukunonu and Atafu. At the national level, advisors to the Taupulegas (Council of Elders) from each atoll, as well as the National Director for the Environment, Economic Development and Natural Resources have requested that, should an ant invasion response occur again, that all atolls undertake it in a standard manner, and that documentation of the project be housed on each atoll so that Tokelau as a nation has access to the information and techniques developed by our project. After the devolution of public services to the Councils of each atoll, this is a promising step forward.

Addressing disappointments or failures during implementation

For the past 2 years, most of our research work has been undertaken on Nukunonu Atoll, despite the fact that Fakaofo Atoll has one island infested with yellow crazy ants. Fakaofo requested help with the ants, but during this last visit we were disappointed with the support from the Taupulega and managers of the atoll in terms of logistical and day-to-day support. Similarly, they had been disappointed that we could not conduct work on Fakaofo over the last 2 years, and there seemed to be some resentment that we had focused our project on Nukunonu Atoll. It was rectified by our efforts in engaging the community, managers and work crew by the end of the trip, but it was a source of frustration and disappointment for both parties to begin with.

The key positive and negative lessons learned from this project

1. On any isolated island, transient people are common. By returning many times during the course of a project, it cements your commitment to the project and increases the understanding that invasive species management is a long-term undertaking. This is essential in gaining community support and cooperation, project ownership by locals and project handover at the end of the project. We learnt this by returning 5 times throughout the project, and this was one of the proponents of success.

2. Understanding the structure and operation of the Tokelau government helped us work within its frameworks and guidelines. It is vital that any project in a Polynesian country starts with learning the subtleties in traditional Polynesian culture and politics before diving headlong into a project. There will always be underlying agendas within a community, which might help or hinder a project. We learnt this toward the end of the project, and it would have been much more helpful at the beginning! It was a positive lesson in the end.

3. Patience and planning was the absolute key in implementing the yellow crazy ant research and management program on Tokelau. The isolation, simple infrastructure and lack of Western-type resources there meant that we had to have contingency plans in place for nearly every plan. We had to work around religious, family and public holidays, and understand that travel, and change in climate and diet affect the way the team operated. Having respect for these things ensures that you are not disappointed when you do not achieve 100% of your project outcomes.

4. The larger project was conducted with a small team who had no previous experience on Tokelau. The project was a large, multi-faceted project, and if faced with the challenge again, we would expand the team and ensure that people involved were specialists in a given area or had previous experience with working on Tokelau. We relied heavily on volunteers either from New Zealand or on Tokelau, but given the nature and magnitude of the project, paid assistants would have been ideal. It would also be beneficial if a representative from one, or all of the stakeholders could be present, or involved in at least one part of the project.

How the project has been promoted

During the course of the project we have taken thousands of photos, so they will not appear here. However, the project has also been the subject of numerous presentations given in New Zealand and Australia, and an upcoming article in Pacific Ecologist. Titles include:

Abbott, K.L., Sarty, M. & McNatty, A. (2005) Yellow crazy ants: supercolony dynamics on islands in the Indian and Pacific Oceans. Ecology & Evolution series seminar, School of Biological Science, Victoria University of Wellington.

Abbott, K.L. (2006) Challenging invasive ants on the Tokelau islands. Invited speaker for Invasive Species Specialist Group, Auckland University, Tamaki Campus.

Abbott, K.L. (2006) Ant-Off trials on Tokelau, Pacific Ocean. Invited speaker at Animal Control Technologies. Toxic bait developer and manufacturer. Melbourne, Australia.

Abbott, K.L. (2006) Developing the tools & technology to control the invasive yellow crazy ant in the Pacific region. Washington DC, National Geographic Seminar series.

Abbott, K.L. Greaves, S.N.J., Ritchie, P.A., & Lester, P.J. (2006) The behavioural ecology and genetics of an ant invasion on Tokelau, Pacific Ocean. International Union for the Study of Social Insects. 6th International Congress, Washington DC.

Abbott, K.L. (In Review) Ants in the Pacific's Pants. Pacific Ecologist.

Follow-up activities

This project would benefit from a follow-up visit to Tokelau to hand over the technical ant control manuals to the Taupulega on each atoll. A future visit would also confirm the commitment of the team to the success of the project. However, due to lack of funding and logistics at this stage, a follow-up visit has not been planned.

Continuation in the future

This project will not continue due to short-term funding and employment opportunities for this type of project at this stage. However, it is hoped that the project provided the example that achievements in the pursuit of controlling invasive ants in the Pacific region can be made. It is crucial to build on progress made on Tokelau.

This project, and indeed CEPF, made it possible to combine ecological research with education and capacity building in a much-needed area – invasive ants. The emergence of the Pacific Ant Prevention Program over the past few years is testimony to people's commitment to, and how important it is to prevent establishment, spread and population explosions of invasive ants in the Pacific in order to preserve the unique ecosystems in the amazing Polynesian-Micronesia Hotspot. We anticipate CEPF's involvement in partnerships that also include researchers, teachers, managers and government at all levels to continue in the preservation of fragile Pacific island environments.