Emergency Response to

INTRODUCED GREEN IGUANAS IN FIJI

BIODIVERSITY
CONSERVATION
LESSONS LEARNED
TECHNICAL SERIES

12

CONSERVATION
INTERNATIONAL
Pacific Islands

BIODIVERSITY CONSERVATION LESSONS LEARNED TECHNICAL SERIES

12 Emergency Response to Introduced Green Iguanas in Fiji

Biodiversity Conservation Lessons Learned Technical Series is published by:

Critical Ecosystem Partnership Fund (CEPF) and Conservation International Pacific Islands Program (CI-Pacific)

PO Box 2035, Apia, Samoa
T: + 685 21593
E: cipacific@conservation.org
W: www.conservation.org

The Critical Ecosystem Partnership Fund is a joint initiative of l'Agence Française de Développement, Conservation International, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. A fundamental goal is to ensure civil society is engaged in biodiversity conservation.

Conservation International Pacific Islands Program. 2013. Biodiversity Conservation Lessons Learned Technical Series 12: Emergency Response to Introduced Green Iguanas in Fiji.

Conservation International, Apia, Samoa

Authors: Nunia Thomas, NatureFiji-MareqetiViti, Suva; Waisale Mataitoga; Theo Blossom; Sipiriano Qeteqete; Jerry Surumi; Kelera Macedru; Reena Fiu; Rick Van Veen

Design/Production: Joanne Aitken, The Little Design Company, www.thelittledesigncompany.com

Cover Photograph: A pair of mating American Iguanas in Fiji, 2011 © NatureFiji-MareqetiViti

Series Editor: Leilani Duffy, Conservation International Pacific Islands Program

Conservation International is a private, non-profit organization exempt from federal income tax under section 501c(3) of the Internal Revenue Code.

OUR MISSION

Building upon a strong foundation of science, partnership and field demonstration, Conservation International empowers societies to responsibly and sustainably care for nature for the well-being of humanity.

ISBN 978-982-9130-12-9

This publication is available electronically from Conservation International's website:
www.conservation.org or www.cepf.net

CONSERVATION INTERNATIONAL Pacific Islands

CRITICAL ECOSYSTEM PARTNERSHIP FUND

The **Critical Ecosystem Partnership Fund** is a joint initiative of l'Agence Française de Développement, Conservation International, the European Union, the Global Environment Facility, the Government of Japan, the MacArthur Foundation and the World Bank. A fundamental goal is to ensure civil society is engaged in biodiversity conservation.

ABOUT THE BIODIVERSITY CONSERVATION LESSONS LEARNED TECHNICAL SERIES

This document is part of a technical report series on conservation projects funded by the Critical Ecosystem Partnership Fund (CEPF) and the Conservation International Pacific Islands Program (CI-Pacific). The main purpose of this series is to disseminate project findings and successes to a broader audience of conservation professionals in the Pacific, along with interested members of the public and students. The reports are being prepared on an ad-hoc basis as projects are completed and written up.

In most cases the reports are composed of two parts, the first part is a detailed technical report on the project which gives details on the methodology used, the results and any recommendations. The second part is a brief project completion report written for the donor and focused on conservation impacts and lessons learned.

The CEPF fund in the Polynesia-Micronesia region was launched in September 2008 and will be active until 2013. It is being managed as a partnership between CI Pacific and CEPF. The purpose of the fund is to engage and build the capacity of non-governmental organizations to achieve terrestrial biodiversity conservation. The total grant envelope is approximately US$6 million, and focuses on three main elements: the prevention, control and eradication of invasive species in key biodiversity areas (KBAs); strengthening the conservation status and management of a prioritized set of 60 KBAs and building the awareness and participation of local leaders and community members in the implementation of threatened species recovery plans.

Since the launch of the fund, a number of calls for proposals have been completed for 14 eligible Pacific Island Countries and Territories (Samoa, Tonga, Kiribati, Fiji, Niue, Cook Islands, Palau, FSM, Marshall Islands, Tokelau Islands, French Polynesia, Wallis and Futuna, Eastern Island, Pitcairn and Tokelau). By late 2012 more than 90 projects in 13 countries and territories were being funded.

The Polynesia-Micronesia Biodiversity Hotspot is one of the most threatened of Earth's 34 biodiversity hotspots, with only 21 percent of the region's original vegetation remaining in pristine condition. The Hotspot faces a large number of severe threats including invasive species, alteration or destruction of native habitat and over exploitation of natural resources. The limited land area exacerbates these threats and to date there have been more recorded bird extinctions in this Hotspot than any other. In the future climate change is likely to become a major threat especially for low lying islands and atolls which could disappear completely.

For more information on the funding criteria and how to apply for a CEPF grant please visit:

- www.cepf.net/where_we_work/regions/asia_pacific/polynesia_micronesia/Pages/default.aspx
- www.cepf.net

For more information on Conservation International's work in the Pacific please visit:

- www.conservation.org/explore/asia-pacific/pacific_islands/pages/overview.aspx

or e-mail us at cipacific@conservation.org

CRITICAL ECOSYSTEM PARTNERSHIP FUND

NatureFiji MareqetiViti

CONSERVATION INTERNATIONAL Pacific Islands

Location of the project in the Polynesia-Micronesia Biodiversity Hotspot

Contents


NatureFiji
MareqetiViti


National Trust
of Fiji Islands
our heritage in trust


BIOSECURITY
AUTHORITY
FIJI


MPI


DEPARTMENT OF
ENVIRONMENT


MINISTRY OF FISHERIES & FORESTS

Lessons Learned

Project Design Process

Aspects of the project design that contributed to its success/shortcomings.

The project design was a good design:

1. Public Awareness Outreach Programme. Without this component of the project, this issue would not have gathered the support it has from the local communities and Provincial office. The manner in which it was delivered: getting their input into the eradication strategy will undoubtedly ensure community and stakeholder support.
2. Training. This component of training local communities in monitoring and euthanasia was an eye-opener; and a good strategy to build local community capacity.
3. Piloting eradication methods. This component is an important one to test the cost-effectiveness of eradication methods. The research for this component helped establish the network of experts identified for the project.

Project Implementation

Aspects of the project execution that contributed to its success/shortcomings.

There are several aspects of the project execution that were important for its implementation:

1. **Establishing a steering committee.** Whilst there was a steering committee in place through the American Iguana Eradication Campaign task force, the project implementation was still largely led by NatureFiji-MareqetiViti – a non-government organization rather than by a government body. This meant that the communities and other stakeholders identified NatureFiji-MareqetiViti as the lead organization for an important issue that needed government leadership. We tried to remedy this having all media released through the Biosecurity Authority of Fiji; and it seems to have worked for other communities not involved in the project. From this project we have learnt that we needed to help the Biosecurity Authority of Fiji by building their staff capacity in biodiversity related invasive species. This has been identified as a key follow-up action for invasive species work in Fiji. Having the steering committee in place and commenting on the progress reports helped NatureFiji-MareqetiViti secure the additional funds to implement the project.
2. **Local counterparts.** Having local counterparts to lead the project on Qamea and Taveuni were imperative. In this project our local counterparts were the village headmen of Naiviivi Village (Jerry Surumi) and Togo Village (Inoke Koli), who were exceptional individuals who led the teams on the ground. We also saw that working with the local village headmen was very efficient when we had the support of the Provincial office; so keeping the Provincial

office updated through reports and by also helping the village headman articulate his report was very helpful. Another very important stakeholder was the National Trust of Fiji who already had established networks on the island. Engaging their local project officer, Sipiriano Qeteqete and his network helped greatly in the outreach programme and in establishing local community ownership of the issue.

3. **Scientific/ Technical Advisory Group.** There was no formal TAG established, but certain individuals were consulted throughout the project to ensure scientific integrity. Having good science from the very beginning of the project greatly helped in communicating the issue and eradication methods to the non-science and non-conservation communities. We knew that the follow-up data collection would be done by local communities, so teaching them foremost of some basic science ethics and methods was very helpful – the data sheets sent in have been filled out appropriately with minimal invalid data. Experts were engaged and lived amongst the communities during the project time. The presence of these individuals and their engagement of local communities to participate in the research greatly helped in the communities' understanding of the project objectives.
4. **Community consultations.** The community consultations towards the eradication strategy were very important. There is no doubt of community support and capacity to participate in the eradication plan. The only issue that needs to be addressed now is the funding to implement the strategy and further research.

Project Summary

An endangered species in its native range of Central and South America, the green iguana *Iguana iguana* has become a pest in as many as thirty countries outside of its native range. Its invasiveness and associated problems is a surprisingly new concept – simply because it was not monitored - but it is becoming increasingly apparent that green iguanas pose a serious threat to biodiversity and the economic well-being of nations into which it has been introduced.

In Puerto Rico for example, the green iguana was introduced through the pet trade in the 1970s; they now have a population of 4 million (exceeding the human population) and the species is an airstrike hazard at the international airport where personnel have removed up to 1798 iguanas per year and annually costing $80,000 for aborted landings because of their presence on the runway.

In its introduced range, green iguanas can reach densities of up to 223 individuals per hectare which is higher than the densities in its native range; have serious negative impact on local crops and infrastructure. The general consensus is that introduced reptiles, particularly human mediated introductions have caused native fauna extinctions, hybridization with native species and increased incidence of salmonellosis in human populations.

The aims of this project were to:

i) contain the green iguana in its current range in Fiji (to the islands of Qamea, Laucala and Matagi);

ii) conduct awareness campaigns to inform the general public about the presence of this iguana in Fiji and the threats they pose and in the process; and

iii) produce and implement a well-informed, widely consulted and feasible eradication plan and program.

In the reports that follow, we detail how, through this project, we achieved a dramatic increase in the level of community and regional awareness of the green iguana, through the collection and dissemination of information; training of staff and implementation of pilot eradication methods.

A

AMERICAN IGUANA *IGUANA IGUANA* AWARENESS CAMPAIGN IN TIKINA LAUCALA, CAKAUDROVE & WAINIKELI

JULY 2010

[ANNEX 1]

KELERA MACEDRU & WAISALE MATAITOGA

ACKNOWLEDGEMENTS

The American iguana (*Iguana iguana*) awareness campaign was made possible through the support of the American iguana Eradication Campaign Task Force and the Critical Ecosystems Partnership Fund.

NatureFiji-MareqetiViti acknowledges the assistance of Cakaudrove Provincial Council, the Fiji Police Department and the National Trust of Fiji who gave their time and knowledge in assisting NFMV in a three week awareness campaign in the Laucala, Wainikeli and Cakaudrove province. Each representative from the respective departments played an important role in enforcing the negative impact the introduced American iguana could have on the Islands in Fiji.

In the second week of awareness, NatureFiji-MareqetiViti had the great opportunity to work with the officials from the Prime Minister's office's Mr. Kisoko Cagituivei with his staff and the Roko Tui Cakaudrove, Ro Aca Mataitini with Assistant Roko Aloesi Rasaciva, whose influence, popularity and connection with the people allowed for a wider audience attending the American iguana awareness program.

The Department of Agriculture, in Waiyevo Taveuni also assisted in the awareness campaign. Rohit is a household name in the islands in the Cakaudrove and Wainikeli province and is most familiar with the introduced reptile, having handled a few American iguanas that were found in the area. His attendance and assistance during the awareness workshops answered a lot of questions by individuals, pertaining to the introduced American iguana.

The awareness program held from 12–30 July 2010, was a great success compounded by the enormous assistance of the above named government and non-governmental organisations. The program could not have been a success without their enormous support.

Acknowledgement also goes to the Tui Laucala for all his assistance he rendered during the 3 weeks in providing accommodation, transport (boat) and his influence in his capacity as paramount head of the Tikina Laucala. Tui Wei – paramount head of Wainikeli and all those under his leadership, the *Turaga ni Koro* of the 15 villages visited, Principals of Niusawa High School and Bucalevu Secondary School. The head teachers of the 6 primary schools we visited and the hotel management in Qamea and Taveuni including – Qamea Beach Club, Maqai Resort, Dive Taveuni and Maravu Plantation Resort.

SUMMARY

The American iguana *Iguana iguana* is now known to have been introduced to Qamea Island in the year 2000. Since then five surveys had been conducted which revealed that it has spread to the neighbouring islands of Matagi, Laucala and Taveuni. The 2009 survey report by the University of the South Pacific recommended that an awareness program be undertaken for the people of Qamea, Laucala, Matagi and Taveuni, and that the introduced American iguana be eradicated or controlled.

Four of Cakaudrove province's monthly *tikina* meetings were attended and presentations made: Cakaudrove (25th June, Lovonivonu Village, Taveuni); Laucala (28th June, Kocoma Village, Qamea island); Wainikeli (29th June, Naiviivi Village, Qamea island); and Vuna (30th June, Kanacea Village, Taveuni). The presentations at the Tikina meetings were well received and enabled permissions to be granted and plans to be set for community meetings at the village-settlement level.

From the 12th to the 30th of July 2010, NatureFiji-MareqetiViti, the National Trust of the Fiji islands, Cakaudrove Provincial Office and the Fiji Police Force undertook a community awareness campaign in the *tikina* Cakaudrove and Wainikeli.

The aims of the campaign were to:

- Inform the communities on the Biosecurity Promulgation in place to control the spread of the introduced American iguana;
- Provide a brief background about the American iguana and its effect on native flora and fauna, the tourism and agricultural industry;
- Teach basic skills in identifying the introduced American iguana from the native and endemic Viti Banded Iguana (*Brachylophus bulabula);*

- Provide a basic and effective American iguana sighting reports and recording system;
- Gather key information about the American iguana during the awareness campaign for assessing extant of the spread; breeding sites; feeding/foraging sites; sunbathing spots and number of individuals encountered within a week.

Thirty presentations were made, covering over 1250 people at villages and settlements, six schools and five resorts. Discussions during the awareness campaign were lively. Whereas previously villagers were beginning to treat the iguana as a novelty and where possible as a pet, the presentations brought home the gravity of the situation and a change in perception was evident. There is now good support for eradicating the American iguana.

Recommendations stemming from the communities were:

1. RESEARCH

1. Research to be conducted on the ecology of the American iguana and extent of damage done on the native fauna and flora by the American iguana;
2. Determine an eradication procedure for the American iguana.

2. AWARENESS

1. Completion of the awareness program in the remainder of the Biosecurity Zone (rest of Taveuni, Laucala, parts of Natewa and adjoining islands);
2. Workshops be held to report back to the three tikina's of Cakaudrove, Wainikeli and Vuna on:
   i. Species and habitat significance
   ii. Damage caused by the American iguana
   iii. The fate/outcome of the American iguanas confiscated from the area under the biosecurity promulgation.

3. TRAINING

1. Youth from the villages where the iguana is currently found be trained to monitor the American iguana and find all its breeding locations;
2. Proper handling and disposal of the American iguana, and eradication methods.

4. ENFORCEMENT OF BIOSECURITY PROMULGATION

1. Officials that are legally appointed to confiscate captured American iguana's need to be trained in handling the species and its proper means of confiscation.
2. There is a need to determine if a jail term is to be enforced in instances where the offender is unable to pay the fine.

5. QUARANTINE PROCEDURES

1. Yachts entering the Fiji group via the Wasa Yatulau passage may carry foreign flora and/or flora. Officials from the relevant authorities need to be present to monitor entry of these vessels. All boat entry sites from Taveuni are recommended to be monitored.

1.0 INTRODUCTION

1.1 Background

The American iguana (*Iguana iguana)* is native to South and Central America. It was first reported on Qamea Island in 2000, thus it may have been established for more than 10 years on Qamea. Recent reports indicate it has spread to the neighbouring islands of Matagi, Laucala and Taveuni. *Iguana iguana* is now referred to as the American iguana in Fiji, primarily to distinguish it from Fiji's three native iguana species which are all green in colour, and also to emphasise the reptile's alien status.

The American iguana has been introduced to several other countries, including United States of America where it is widespread in Florida and also to Puerto Rico. Based on problems experienced in these countries, the American iguana is potentially a serious pest in Fiji of village gardens and farms, an unwanted nuisance to the tourism industry, an agent of *Salmonella* poisoning, while their burrows undermine seawalls and foundations. Most importantly, its interaction with our own very special iguanids is completely unknown and an issue of great importance.

The Department of Agriculture under the Ministry of Primary Industries formed an American iguana Eradication Campaign (AIEC) taskforce in February 2010. The AIEC taskforce consists of several Government and Non-Government stakeholders whose tasks is focused on the control and or eradication of the American iguana population from the islands it has been introduced to and the prevention of it spreading to other islands in the Fiji group *(*refer Appendix I for details*)*. Upon the formation of the taskforce, a Biosecurity promulgation was put in place on the 4th of March 2010, where it was stated that the islands of Qamea, Matagi, Taveuni and Laucala were declared Biosecurity Emergency Areas. Movement of all stages of the American iguana including its eggs, in and out of the Biosecurity declared areas is strictly prohibited. Any persons found in possession of the reptile after an amnesty period, 30 days from the 5th of March, is said to have committed an offence and is liable to a fine not exceeding $50,000 for an individual and $250,000 for a corporate body (Appendix II).

The American iguana awareness zone includes all the islands stated above, but the initial stage of awareness is directed at Qamea, Matagi , Laucala and Taveuni Island including the villages , settlements, hotels, primary schools and High schools in the said district for the islands of Qamea, Matagi, Laucala and Taveuni (Map 1).

2.0 Methods

The American iguana Awareness Campaign was undertaken in two stages:

1. Tikina Level Meetings in the Tikina Cakaudrove, Vuna, Wainikeli (25th – 30th June, 2010);
2. Community meeetings in Qamea, Matagi and northern Taveuni including villages, settlements, resorts, primary schools and high schools.

Map 1: The American iguana awareness zone.

2.1 Tikina Meetings

The NatureFiji-MareqetiViti team was led by Mr. Waisale Mataitoga of Somosomo village with Kelera Macedru (NFMV project officer) and Sipiriano Qeteqete of the National Trust of Fiji.

Prior arrangement by Mr. Mataitoga enabled the Roko Tui Cakaudrove, Ro Aca Mataitini to grant the awareness team fifteen minute sessions in the province's monthly *tikina* meetings for the *tikina* Cakaudrove (25th June, Lovonivonu Village, Taveuni); Laucala (28th June, Kocoma Village, Qamea island); Wainikeli (29th June, Naiviivi Village, Qamea island); and Vuna (30th June, Kanacea Village, Taveuni).

The objectives of the Tikina level awareness presentations were to inform the various *turaga ni koro* on the following issues:

- The formation of the American iguana Eradication Campaign Task Force and its roles;
- The biosecurity promulgation on the American iguana and the islands of Taveuni, Qamea, Laucala and Matagi;
- The key physical differences between the introduced American iguana and Fiji's native Vokai iguanas *Brachylophus* spp;

- Gather initial information on the American iguana; and
- To confirm the follow-up village level awareness workshop dates and venues.

2.2 Community Meetings

- Consultation: Waisale Mataitoga had arranged for awareness dates with different villagers during the Tikina meetings in which the village representatives from the Tikina Wainikeli and Cakaudrove were present.
- Logistics planning was conducted by Waisale Maitoga with the Cakaudrove provincial office
- Materials: NatureFiji-MareqetiViti prepared 1000 copies each of two posters (See Appendix VII) – over 500 of each were distributed during the campaign
- Awareness campaign by relevant stakeholders: The Cakaudrove provincial office, Fiji Police force, the National Trust of Fiji and NatureFiji-MareqetiViti.

Facilitators included:

- Waisale Mataitoga (NatureFiji-MareqetiViti – Campaign Coordinator): Background and objectives of the awareness
- Aloesi Rasaciva (Assistant Roko): The assistance of the *Turaga ni Koro* in collecting data for reported sightings of the American iguana
- Semi Maku (Special Branch officer): The Biosecurity Promulgation
- Sipiriano Qeteqete (National Trust Ranger): Threats that the American iguana poses to, Taveuni and Qamea's biodiversity/ livelihood and the tourism industry
- Kelera Macedru (NatureFiji-MareqetiViti): Biodiversity issues.

Table 1: The Awareness Campaign Meetings and Presentations *Tikina Laucala*

Dates	Venue
12/07/2010	Dreketi (pm)
13/07/2010	Kocoma (am)
	Kocoma Village School
	Laucala District School
14/07/2010	Togo Village(am)
	Vuanicau Primary School
Tikina Wainikeli	
15/07/2010	Nadilo Village
	Naiiviivi village
16/07/2010	Vatusogosogo settlement

18/07/2010	Lavena Village
20/07/2010	Qeleni Village Naselesele
21/07/2010	Korovou-Bouma Village
	Vidawa Village
	Waitabu Village
22/07/2010	Lamini Village
	Somosomo Village
	Welagi
23/07/2010	Lavena Primary School
	Bouma Primary School
26/07/2010	Maravu Plantation Resort
	Taveuni Island Resort
	Wai Settlement
	Vurevure Village
27/07/2010	Matagi Island Resort Qamea Beach Club
	Wainimaqai resort
	Navakacoa Settlement
28/07/2010	Lovonivonu village
	Dreketi Village (Taveuni) NB: These villagers were not visited as they had reported that the first visit during the Tikina meetings was enough as many in the village attended the Tikina Meet.
30/07/2010	Niusawa Secondary School
	Bucalevu Secondary school

2.3 Surveys

During the awareness campaigns, surveys and anecdotal evidence in relation to the improvement of our knowledge about the American iguana was recorded.

2.4 Evaluation of awareness campaign

Evaluation forms were distributed to workshop attendants; this was used to gauge their understanding on the importance of the awareness program on the introduced American iguana. It was also a means of feedback for reporting sightings of the American iguana. Evaluation was carried out when possible in the villagers and settlements visited (refer Appendix III). It is to be noted that not all the villagers and settlements received Evaluation forms, as the awareness team did not have the time for evaluation. There were many villagers to cover in a single day, this was especially during awareness in the *Tikina Wainikeli* (Taveuni side)

A Strengths Weaknesses Opportunities Threats (SWOT) analysis was also carried out for the facilitators involved in the awareness campaign. Two of the facilitators participated in the analysis,. These were Sipiriano Qeteqete (NTF) and Kelera Macedru (NFMV)

Data Tables were provided for the Turaga ni Koro in each village as a means of collecting data for anyone who reported on observing an American iguana (See Appendix IV). The Data tables are recommended to be submitted into the next Tikina Meetings (possible in the second week of September, 2010) to a representative from the Provincial Council.

3.0 RESULTS

3.1 Tikina Meetings

The results of the Tikina Meetings are presented and discussed in the report on those meetings – refer Appendix VI.

3.2 Community Meetings

The Awareness Campaign presentations were attended by over 1,250 people in 30 different locations (refer Table 2).

Table 2: Attendance at the Different Awareness Campaign Presentations

Tikina (Province)	No. of villages	No. of settlements	Schools visited	Resorts visited	No. of attendants
Tikina Laucala	3	-	3	1	318
Tikina Wainikeli	10	2	3	2	398
Tikina Cakaudrove	3	-	1	2	555
Total	16	2	7	5	1,271

3.3 Evaluation Forms

In the villages, settlements and schools the response in completing evaluation forms was very good. The forms provided some information on issues which were not otherwise discussed. One issue which was raised in most locations concerned eradication methods – the thoughts of villagers, the need for eradication and how to kill American iguanas. Via the use of posters, 90% of the attendants were able to identify the differences between American iguana and that of the Viti Banded Iguana. There is also an understanding of the severity of fines imposed on those harbouring an American iguana, both for an individual and that of a corporate body.

TIKINA LAUCALA

Venue	Possible Eradication process	Reported sightings	Comments
Togo Village	• Ideas on eradicating the species: once seen it is to be killed; destroy its breeding place.	• Togo village and at Niubavu	• Workshop to be done on eradication method
Kocoma village	• Wait on the best method of eradication by the researchers and scientists • To kill the American iguana at first sight	Yaroi Estate	

TIKINA WAINIKELI

Venue	Possible Eradication process	Reported sightings	Comments
Nadilo Village	• Once seen, it is to be removed from our islands • Once found it is to be killed on site	• Naiiviivi	• Saw it taken to Labasa • Sam Florence said to have a captive American iguana
Naiiviivi village	• To be completely eradicated • To be killed on site • Those who kill an American iguana are to be rewarded	• Naiiviivi Village • Qamea • Mangrove area • The forest •Yaroi Estate	• The research on eradication needs to be done quickly so it can be applied
Waitabu village	• Kill an American iguana on site		
Wai Settlement	• To kill an American iguana on site • Only kill an adult American iguana and not its eggs		

TIKINA CAKAUDROVE

Venue	Possible Eradication process	Reported sightings	Comments
Lamini	• if an adult American iguana is found it is to be killed • If of a juvenile size (16cm) to be taken to NFMV • Destroy their breeding place	• Qamea, Naiiviivi	• Those in Naiiviivi have a captured American iguana
Welagi	• To kill on site • Kill the A. iguana using a type of bait		
Somosomo	• People should work together in eradication process • Put up a law for people to kill the A.iguana		

RESORTS

Note that no evaluations were done at the resorts, but the discussions were noted.

Venue	Possible Eradication process	Reported sightings	Comments
Matagi Island Resort	(no comment)	Matagi Island	Three American iguana's that were found in the island, have since disappeared since Cyclone Tomas (April 2010)
Qamea Beach club	Burn out the breeding site (Yaragau)	• Qamea Beach club • Yaragau	The juvenile American iguana's are found on the Qamea beach club property, 50m away from Yaragau.
Wainimaqai resort	(no comment)	No sightings on the resort	Absence of the Tavola tree at Wainimaqai resort.
Taveuni Island Resort	Consume the American iguana	No sightings	
Maravu Plantation resort	Kill on site	No sightings	

3.4 Prime Minister's Office Consultation

In northern Taveuni, the American iguana awareness presentations were undertaken in conjunction with the Prime Minister's Office tour. This ensured that all meetings were well attended and the officials were very supportive of the campaign and emphasised its importance. Through the assistance of Roko Tui Cakaudrove, the Prime minister's office consultation continued the

awareness on the American iguana to Vuna province. Vuna province was not planned for a visit, due to the restriction in time, but the assistance from the provincial council and the prime minister's office was enormous.

3.5 Information Gathered During Community Discussions

Discussion following the presentations was always free flowing with good participation, questions and opinions. Feedback recorded during presentations provided the following information

- There is always an issue with visitors bringing in foreign fauna via the W*asa yatulau* (not the port of entry for Fiji) therefore there are no quarantine measures undertaken in respect to these visitors, especially yachts.
- There had been reports from the residents in Dreketi and Kocoma village, of a type of iguana that has web like feet (like a duck) in Laucala island, it is recommended that relevant authorities look into the matter.
- November 2009, an American iguana was sighted in the mangrove areas in Togo village, Qamea.
- Prior to the American iguana awareness at Naiiviivi village, Jerry Suruwai (*Turaga ni* koro) captured an American iguana believed to be a pregnant female. This was later confiscated by authorities from the Agricultural office in Taveuni and a representative from their Suva office.
- Turaga ni Koro from Naiiviivi village raised the issue that there was never any feedback on what was done to the reptiles from relevant authorities when the first American iguana was first reported to them in the year 2000. He later stated that people would have assisted earlier in stopping the spread of the introduced species, but this was not done and it was allowed to spread because no one had said anything on the problems that could have been faced with the presence of these species.
- After cyclone Thomas (March 2010), a lot more of the reptiles were seen in Naiiviivi village and Vatusogosogo settlement.
- Two weeks before the awareness team came to Qamea Island, a resident at Vatusogosogo settlement stated that he had seen an American iguana near the mangrove areas in their settlement that looked like an standing average sized adult cat, but upon closer observation was an orange coloured American iguana (*moko ni Yaroi)* that was sunning itself. The large scale beneath its ear was highly visible. The reptile was not captured.
- Observations by the local residents at Vatusogosogo settlement was that the American iguana would be a sign of rainy weather, as they would head for the mangrove areas just before the area would experience rain. It was also common occurrence for the locals to hear the splashing of the reptiles when escaping into the water when they approach the mangrove site.
- Residents at Vatusogosogo settlement stated that the current caretaker at Yaroi estate would sack any of the labourers in the estate if they had killed an American iguana.
- At Qamea Beach Resort, Tracey Purcell had taken pictures of an American iguana that was found in the beach area in front of the resort. She had also shown some trees in the area, the 'Drala' *(Erythrina variegata)* and the two 'Tavola' trees *(Terminalia catappa)* in which a young American iguana was said to be found on, that was now completely barren of leaves.
- At Navakacoa settlement, a lady stated that she had seen half eaten 'Uto' leaves *(Artocarpus altilis)* all over the ground where it had fallen from the tree. Upon close inspection, the leaves appeared to be eaten with the apparent teeth marks on the leaves. It was later believed by the observer, that this may have been done by the introduced American iguana.

3.6 SWOT Analysis

STRENGTHS:

- The use of awareness materials allowed attendants at the workshop to understand clearly the differences between an American iguana and that of the native species.
- Facilitators involved in the awareness workshop, were very influential in their part of the awareness.
- Schools visited were very interested in the presentations about the American iguana, this was observed from the questions asked.
- Awareness with the Officials from the Prime Minister's office allowed for a larger attendance to the awareness by individuals, while their assistance had saved a lot of expenditure for the awareness team.

WEAKNESSES:

- Absence of Quarantine officers, who could assist in answering questions posed by the people in terms of border control.
- Travelling in a large group of facilitators with different topics, diverts the attention of the attendants from focusing on one particular issue, this was the case in the Tikina Wainikeli (Taveuni side).
- Change in prepared schedule for the awareness has led to unnecessary rescheduling of awareness workshop.

4.0 DISCUSSION

Based on the information gathered during discussions, the American iguana is confirmed present on three islands – Qamea (6 locations all over the island); Matagi; Taveuni (2 locations). There are unconfirmed but convincing reports from Laucala and one other location on Qamea (Map 2).

Map 2: Locations where American iguana have been sighted in Qamea and Taveuni Island. Red block – confirmed sightings; pink block – unconfirmed sightings.

A common subject of discussion was whether it was alright to kill an American iguana once it was spotted. Individuals interviewed are familiar with the differences between an American iguana and that of the native Banded Iguana. According to Rohit of the Agriculture office (Waiyevo, Taveuni) four (4) American iguanas have been reported to have been killed (2 dissected by the Agriculture office, Waiyevo, 1 Naiviivi and 1 Matagi). With caution, it had been re-iterated during the awareness workshops that the juvenile American iguana, not be killed at this point, as they closely resemble that of the native species. A directive from the American iguana Task Force on the fate of captured or observed iguanas is clearly needed.

Community members have been reminded that a fine will not be imposed if an American iguana is captured or killed, if the individual reports the find to the *Turaga ni Koro* in the case of a villager, or to the Manager of a resort, for hotel employees; and teachers for students in boarding schools.

There has not been any record of the American iguana, physically wounding a person but villagers are interested in the likely behaviour of the reptile when surprised or harassed. All recorded encounters of the American iguana in Fiji state that the animal avoids human contact. All those known to have witnessed the American iguana, have always stated that the reptile would avoid human contact. This may be the case now in Fiji, but in cases overseas where the American iguana has been introduced it can rapidly become accepting of the presence of human and the likelihood of close encounters with unknown reaction increases.

Consuming the reptile as a means of eradication is widely discussed amongst the people according to the questions received via the awareness campaign. This was not encouraged during the awareness as no one has been known to try consuming the introduced reptile and it may also lead to people breeding the reptile for consumption or taking it to other islands.

There is concern by the public that the proper authorities take to task the person suspected of bringing the American iguana into Qamea Island.

5.0 RECOMMENDATIONS

5.1 Tikina Meetings

Seven recommendations were made following the Tikina level meetings and the pertinent ones for the follow up community meetings were implemented:

- Flyers and posters produced for the American iguana awareness campaign be translated into Fijian; and printed as A3 sized posters
- Flyers and posters to contain the following information
- Threats posed by the American iguana
- Key differences between the American iguana and Fiji's native iguanas
- Key information to record when an iguana is sighted
- It is important to note the differences between the American iguana and the native iguana. There have been perceptions by locals that the native iguana does not have a dewlap; that the eardrum of the American iguana does not have a hole while that of the banded iguana does. (They most likely think that the large scale below the eardrum of the American iguana is its eardrum.)

- Research on the damage caused by the American iguana should be conducted as soon as possible. This information must be disseminated to the local communities who do not see the reptile as a threat. American iguanas are currently perceived to be a curiosity or object of interest.
- Questions during *tikina* meetings were more focused on improving income generating sources like acquiring licenses to fish, and receiving dalo plantings from the Agriculture department. A thorough research on the damage caused by the American iguanas in countries it is considered to be an invasive species needs to be conducted and highlighted during the awareness campaign. The American iguana is a potential threat to the taro industry of Taveuni.
- Hotels/Resorts in the Cakaudrove province should also be targeted for awareness as the hotel workers are the most likely vector of the young American iguanas. The Tourism industry has also been greatly affected in countries where the American iguana has been introduced.
- Clarification needs to be made on the alternative penalties for those who are caught with the American iguana but are unable to pay the fines. What happens when the biosecurity promulgation expires?

It is recommended that research be conducted on the island of Qamea about the American iguana before an awareness campaign is continued in the rest of the biosecurity-declared islands, to provide data to the people about the destruction done by the introduced species.

5.2 Research

It is highly recommend that a thorough research be done as soon as possible into the 'bbest' method of eradicating American iguana from those islands it has been introduced to. This has become necessary as people are willing to eradicate the species at any possible means and these may pose a danger to harming the native flora and fauna living closely with the introduced reptile.

Although the American iguana is primarily a herbivore we need to know exactly what it is eating, and what it eats overseas.

A third possible breeding site for the American iguana is at Nadilo village. The burrows observed in the sandy areas before the village, closely resemble the burrows that were observed in Yaragau and on Matagi Island. This will need to be clarified through research.

Niubavu has been a common area of sightings on the American iguana, by villagers at Togo. It is possible that a breeding site is found in that estate.

American iguanas are known to carry *Salmonella* bacteria, research can determine whether anyone has been affected by the bacteria whilst in contact with the reptile.

The presence or absence of the American iguana in Laucala Island needs to be confirmed, as the facilitators in the said awareness campaign were not allowed entry into the island.

5.3 Biosecurity Promulgation

It is recommended that the Biosecurity promulgation be extended, as its ends in the month of August.

For seizure of any captured American iguana, it is recommended that an ID be present on any officer authorised to seize a captured American iguana and or its eggs with an identified method of euthanizing the said reptile.

5.4 Workshop based on the American iguana

It is recommended that a workshop be held by an experienced scientist, familiar with the American iguana on handling the reptile and the 'best' method of eradicating it. Recommended attendants to the workshop should be the *Turaga ni Koro's* and representatives from the Island resorts, as they are the contact person for field data, on any sightings of the introduced reptile.

Workshop to be attended again by Agriculture officers on the activities of the department in disposing of the past received American iguanas as a means of feedback to the people reporting the sightings.

5.5 Feedback to the People of Qamea, Matagi and Taveuni.

In the second week of September, a Tikina meeting is proposed to be held. Any feedback from the *Turaga ni koros* on any sighted American iguana may be presented. It is recommended that a representative from the awareness team and or research team about the American iguana be present to answer any queries and or suggestions posed during the meetings.

6.0 REFERENCES

Naikatini, A, Niukula, J, Raiwalui, V, Tawaka, S, Qeteqete, S. 2009, 'Alien Iguana Survey, Qamea Island, Cakaudrove Province Fiji'. Unpublished report by the University of the South Pacific, Fiji.

Meshka, W, Smith, H, Golden, E, Moore, J, Fitchett, S, Cowan, E, Engeman, R, Sekscienski, S, Cress, H. 2007, 'Green Iguanas (*Iguana iguana)*; The unintended consequence of sound wildlife management practices in South Florida Park', *Herpetological Conservation and Biology* 2(2): 149- 156.

APPENDIX I

INFORMATION PAPER

BACKGROUND

According to a survey report by the University of the South Pacific (Naikatini *et al*., 2010), the green (American) iguana (*Iguana iguana*) was introduced onto the island of Qamea, Cakaudrove Province in 2000. The source of these introduced iguanas is unknown at this stage.

The first site of introduction was Yaroi Estate, located on the south west side of Qamea Island. Five surveys have been conducted since the first report to the Fiji Department of Quarantine in 2002. The first was undertaken by the Fiji Quarantine Department, followed by the University of the South Pacific (2003), University of the South Pacific with the Department of Environment, Department of Biosecurity Services, National Trust of Fiji (2009), Fiji Department of Biosecurity Services (2009) and Dr. Rob Fisher and Dr. Peter Harlow (2010).

Since its introduction, the iguanas have spread into other parts of Qamea Island and onto the neighboring islands of Matagi, Laucala and Taveuni. In early 2010, visiting herpetologists, Dr. Rob Fisher and Dr. Peter Harlow recorded breeding populations on Qamea Island and Matagi Island. They concluded that the American iguanas were being transferred between different islands by local hotel staff who thought that they were the endemic Viti banded iguanas (*Brachylophus bulabula*). They suspect that the American iguana has also been taken to the main island of Vanua Levu.

In March 2010, a report was lodged from an inter-island ferry service on the release of the American iguana into Viti Levu by a passenger onboard the vessel.

The Department of Environment, having commissioned the first 2009 report by the University of the South Pacific chaired the first *Iguana iguana* 'incursion response' meeting in January 2010.

The Ministry of Primary Industries, under the Department of Agriculture formed an American iguana Eradication Campaign (AIEC) Task Force in February 2010. The AIEC task force consists of several government and non-government stakeholders:

- Mr. T. Tunabuna (Director of Animal Health & Production) – Chairman.
- Mr. I. Boa (Director of Biosecurity) – Deputy Chairman.
- Ms. Ateca Cakautini (Dept. of Biosecurity) – Secretariat.
- Dr. Ken Cokanasiga (SPC) – Technical advisor.
- Dr. Robin Achari (Principal Veterinary Officer)–Technical operations coordinator.
- Dr. Dick Watling (NatureFijiMareqetiViti) – Technical Advisor.
- Ms. Nunia Thomas (NatureFijiMareqetiViti) – Technical Advisor.
- Mr. Ilaisa Dakaica (Dept. of Biosecurity) – Member.
- Mr. Aisake Vucago (Dept. of Forests) – Member.
- Mr. Suliasi Tawake (Director Extension) – Member.
- Ms. Eleni Tokoduadua (Dept. of Environment) – Member.
- Ms. Losalini Toganivalu (Dept. Agriculture - Research) – Member.

The key roles of the American iguana Eradication Campaign Taskforce are:

1. To ensure prompt declaration of the islands of Taveuni, Qamea, Laucala and Matagi as biosecurity areas mainly for the American iguana (*Iguana iguana*). Appropriate fines are to be set.
2. To look at strategies which will assist in recovering American iguanas that have been moved from the declared biosecurity area (e.g. Amnesty).
3. To facilitate the hiring of and terms of reference for a specialist herpetologist to strategise and implement the eradication campaign.
4. To identify eradication strategies and draw up plans for the eradication campaign.
5. To develop materials, strategies and communication and media release strategies for creating awareness on the American iguana and its potential risks.
6. To formulate a sound budget for the eradication campaign and identify potential funding sources.
7. To compile and provide progress reports on a weekly basis.
8. To develop the procedures for Agricultural officers when handling reported cases and receipt of American iguanas during the amnesty period.
9. To facilitate for all officers involved in the operation to be appointed by the Minister for Primary Industries as temporary Biosecurity Officers.
10. To consider the legality of the Biosecurity Promulgation to give effect to the Iguana operation i.e. Awareness Programme, Eradication and Surveillance and Monitoring.

On March 10th 2010, through the AIEC Task Force, a Biosecurity Promulgation was released declaring the islands of Qamea, Taveuni, Matagi and Laucala as a biosecurity zone, and effectively making the transporting of the American iguanas illegal.

An amnesty period of 30 days (March 10th – April 9th, 2010) was given to the general public to surrender any American iguanas in their possession.

The following penalties apply to any individuals or corporate bodies found in illegal possession of the American iguanas:

- Up to $50,000 – for individuals
- Up to $250,000 – for corporate bodies.

Please report any sighting/ capture of the American iguana to:

NatureFiji-MareqetiViti
Phone: 3100 598
Fax: 3100 582
Email: support@naturefiji.org
Website: www.naturefiji.org
Please do not hesitate to contact us for any further information.

Appendix II

BIOSECURITY PROMULGATION 2008

[GAZETTE NOTICE NO.]

BIOSECURITY PROMULGATION 2008
(Promulgation No.28)

DECLARATION OF BIOSECURITY EMERGENCY AREAS FOR GREEN IGUANA
(Iguana Iguana)

IN exercise of the powers vested in me by Section 77 of the Biosecurity Promulgation 2008, with the advice of the Biosecurity Authority and in consultation with the National Disaster Management Council, I hereby declare that the whole islands of Qamea, Matagi, Taveuni and Laucala to be Biosecurity Emergency Areas due to the presence of Green Iguana in these areas.

The Declaration is for a period of six months from 5th March, 2010.

Movements of all stages of Green Iguana (Iguana Iguana) including its eggs into and out of the declared Biosecurity Emergency Areas is strictly prohibited.

An amnesty period of thirty (30) days from 5th March, 2010 is now in place for anyone who has any of these Green Iguanas in his or her possession, to surrender them to the nearest Agriculture Office.

Any breach of this Biosecurity Emergency Regulations is an offence which is subject to the maximum penalties not exceeding a fine of $50, 000 for an individual or $250, 000 for a corporate body.

MADE at Suva on this 4th day of MARCH 2010.

Joketani Cokanasiga

Appendix III

AMERICAN IGUANA AWARENESS CAMPAIGN EVALUATION FORM

1. Vakamacala taka e rua na tiki ni yago cava o na vakaraica ena kena vakaduiduitaki na American iguana mai vei na Viti Banded Iguana?

2. Ivei na vanua e vakalutu yaloka kina o American iguana?

3. Ivei na vanua e vakalutu yaloka kina o Viti Banded iguana? (Vokai ni Viti)

4. Ivei na vanua e manumanu taukei kina na American iguana?

5. Na cava na totogi esa vakaroti tu me baleta na kena maroroya e dua na tamata vatakei dua na kabani na American iguana?

6. Ocei mo lai tukutuku kina kevaka o sa raica edua na American iguana? (Answ: Turaga ni koro.)

7. Cava na nomu nanuma e na kawaboko taki vakacava na American iguana?

8. O sa bau raica edua na American iguana?

9. Na cava na kena levu?

10. O raica mai ivei?

11. E se bula tiko ga se sa mate?

12. E dua o kila, maroroya tiko na American iguana?

13. Kevaka e dua tale na vakamacala ni via vakaraitaka mai, sa kerei mo ni vola tiko ga ena lavelave oqo.

Vinaka vaka-levu

Appendix IV

Information recording on sightings of the American iguana

No.	Date	Time	Location		Habitat (please ✓)						Details (please ✓)			Size/kena balavu (nose to tip of tail, cm)	Pointy scales on dewlap (✓)	Scale under eardrum / (varina) (✓)
			Name of village/ Yaca ni koro	Name of settlement/ yaca ni tikotiko	Beach/ Baravi (✓)	Mangrove forest/ Vei dogo (✓)	Sea/ Waitui (✓)	River/ Waidranu (✓)	Other (please note)/Loma ni teitei se koro	Ground/ Dela ni qele (✓)	Tree/ Ena taba ni vunikau.Yaca ni vunikau (Please write what tree)	Under water/ Loma ni wai (✓)				
1.																
2.																
3.																
4.																
5.																
6.																
7.																
8.																
9.																
10.																

Appendix V

AWARENESS PROGRAM REPORT

WAISALE MATAITOGA

SUMMARY

The sighting of the American iguana in Qamea back in the year 2000 has brought about a great concern to the islanders. Its increase in numbers and its sightings on neighbouring islands is now a national matter thus the need to hold awareness of the threats that this species can bring to the communities concerned.

My role was to co-ordinate the awareness program within the three district of Laucala, Wainikeli and Cakaudrove.

The tentative awareness program set up with the NatureFiji–MareqetiViti personnel was as follow:

Dates	Venue
Tikina Laucala	
12/07/10	Dreketi
13/07	Kocoma (am) Ucunivatu (pm)
14/07	Togo (am) Onadere (pm)
Tikina Wainikeli	
15/07	Naiviivi (am) Nadilo (pm)
16/07	Vatusogosogo (am)
19/07	Lavena Village
20/07	Korovou-Bouma Village
21/07	Vidawa
22/07	Waitabu
23/07	Wai
26/07	Naselesele
27/07	Qeleni
28/07	Navakacoa
29/07	Yanuca Is

ACKNOWLEDGEMENTS

The first round of the awareness program would not have been successful without the assistance and presence of the mentioned Government Departments and individuals:

- Provincial office – Roko Tui Cakaudrove and Assistant Roko Somosomo.
- Prime Minister's office per Mr. Kisoko Cagituivei and his staff.
- Police Department – Taveuni.
- Agriculture Officer – Taveuni.
- Tui Laucala for all his assistance he rendered during the 3 weeks:
  - Accommodation
  - Boat
  - His influence in his capacity as paramount head of the Tikina Laucala.
- Tui Wei – Paramount head of Wainikeli and all those under his leadership.
- The turaga ni Koro of the 15 villages we visited.
- The principals' of Niusawa High School and Bucalevu Secondary School.
- The Head Teachers of the 6 primary schools we visited.
- The Hotel management in Qamea and Taveuni including – Qamea Beach Club, Maqai Resort, Dive Taveuni, Maravu resort,

INTRODUCTION

The role of coordinating the American iguana awareness programme was delegated to me at the beginning of June. From the 11th to the 17th of June, approaches were made to the Roko Tui Cakaudrove in Savusavu, Tui Wei of Wainikeli, Tui Laucala of the tikina Laucala and Tui Vuna for their blessings in the conducting of the awareness programme in their respective tikinas. The tikina council meetings were held two weeks later wherein the programme was relayed to the forum and dates and venues were confirmed.

PURPOSE/OBJECTIVES

- To organise various meetings centres for the awareness programme.
- Compilation of the budget for the entire programme.
- Inviting other resource personals (Roko Tui Cakaudrove, Police Department) to be part of the programme.
- Organising transportation and billeting venues for the awareness team.

PROGRAMME REPORT

ACTUAL AWARENESS PROGRAMME CAMPAIGN

Dates	Time	Venue	Tikina	Attendance %	Remarks
12/07	7.30pm	Dreketi	Laucala	35%	Questions raised as to how the American iguana was first introduced into the island. The villagers are concluding that youths from a nearby settlement brought the iguana from Nauradua Sett in Naiviivi and are raising it in their settlement.
13/07	11am	Kocoma Vill		30%	Villagers enquired whether the iguana is edible.
	2pm 3.30pm	Kocoma Primary Sch Laucala Dist Sch		90% 90%	Students of the two schools were very keen to learn about the existence of the iguana.
14/07	10.30am	Togo Primary Sch		90%	
	5.30pm	Togo Vill (pm		65%	Most of the villagers have sighted the iguana, as most of them work in the two nearby resorts. (Matagi & Laucala Resort)
15/07	10am	Nadilo	Wainikeli	60%	Villagers are suspecting that there are more iguanas in the interior of the village which is a wetland and need further observation.
	3.30pm	Naiviivi Primary Sch		90%	Most students have seen the iguana and were keen to know about it.
	7pm	Naiviivi Village		60%	Now that they know of the danger that the reptile poses to their environment, they are eager to be part of the eradication programme.
16/07	9.30am	Vatusogosogo		50%	Almost all the villagers have seen the reptile near the village and the mangrove areas. Villagers would hear the splashing of the reptiles when escaping into the water when they approach the mangrove site.

Dates	Time	Venue	Tikina	Attendance %	Remarks
18/07	4 – 8pm	Lavena Village		80%	Villagers were very interested to know more about the reptile. Enquired of how it was introduced into Taveuni after its sightings at Vurevure.
20/07	10am – 1.30pm	Qeleni		80%	Some villagers have seen the reptile at Waibula. Villagers enquired of how they can get rid of it if it starts to damage their dalo plantation.
	3 – 5.30pm	Naselesele		80%	People are keen to learn more about the reptile.
21/07	10am – 12.30pm	Korovou (Bouma)		75%	Reptile is edible or not? How it can be eradicated?
	2.30 – 4.30pm	Vidawa		75%	They are willing to be part of the eradicating team should the need arises.
	5pm – 6.30pm	Waitabu		80%	An immediate need to clear the reptile off the island of Taveuni.
22/07	10.30am – 1pm	Lamini,	Cakaudrove	60%	Very keen listeners as most have not seen the reptile.
	2.30pm – 5pm	Somosomo,		15%	
	6 – 8pm	Welagi		60%	
26/07	10 – 11am	Maravu Resort		45%	All are willing to assist in whatever way they can.
	1.30 – 2.30pm	Dive Taveuni		60%	Very keen to know more about the reptile, and are willing to assist in whatever way they can.
26/07	4.30 – 6pm	Wai		65%	Willing to assist in the locating of the one discovered at Vurevure.
	6.30 – 7.30pm	Vurevure Sett		65%	A reptile was discovered in the area and the community are willingly availing themselves for the eradication programme.

Dates	Time	Venue	Tikina	Attendance %	Remarks
27/07	12.30 – 1.30pm	Matagi Island Resort		60%	A reptile was discovered at the resort but seemed to disappear after Cyclone Tomas. However, the community are still very observant of any new development or signs of the reptiles.
	2 -3pm	Qamea Beach Club Resort		80%	There is a clear sign of the presence of the reptile within the resort premises. A picture of the reptile was taken by the management.
28/07	10.30 – 11.30am	Maqai Resort		60%	No sign of the presence of the reptile, but the community are also on the lookout for any new development.
	3 – 4pm	Navakacoa Vill		55%	Very keen listeners. A lady villager had seen half eaten Uto leaves all over the ground where it had fallen from the tree. The leaves have teeth marks and the lady concludes that it can be done by the reptile. There can be some truth in this observation because of the discovery of the reptile on Waibula river which is ½km away from the village.
30/07	11.30am – 12.30pm	Niusawa High Sch		90%	A good learning exercise for the student and teachers. Students from Qamea and the northern end of Taveuni have a fair idea of the appearance of the iguana.
	2.30 – 4pm	Bucalevu Sec Sch		90%	

RECOMMENDATIONS

At the completion of the awareness programme, I recommend the following:

- A research be done by a specialist to verify the claims by the villagers on the island. The main area of concern is Naiviivi and its neighbouring settlements and resorts, Navakacoa village up to Vurevure settlement and may include Waitabu village.
- Two workshops to be conducted in Qamea and the northern end of Taveuni, wherein turaga ni koro's and 2-3 youths to be trained on the eradication of the reptile.
- Provision of OHS materials such as raincoats, life jackets and any other items necessary for the conduction of the programme.
- At the completion of the awareness programme and having witnessed the damages done by the reptile, it is recommended that there is an urgent need to train the villagers for the eradication of the reptile, instead of government having a special operation for the eradication programme.

APPENDIX VI

American iguana: A Threat to Fiji's Economy and Biodiversity

Community Outreach Programme on the Introduced American iguana, *Iguana iguana:* Tikina Cakaudrove, Vuna and Wainikeli

KELERA MACEDRU, WAISALE MATAITOGA

TAVEUNI, JUNE 2010

ACKNOWLEDGEMENTS

The project is a partnership between NatureFiji-MareqetiViti, The Ministry of Primary Industries (Department of Agriculture, Department of Forests, Department of Biosecurity, Department of Quarantine) and the Department of Environment, who form the American iguana Eradication Campaign Task Force.

Further technical assistance and personnel has been generously provided by the University of the South Pacific (South Pacific Regional Herbarium), National Trust of Fiji, Cakaudrove Provincial Office and the Fiji Police Department (Northern Region).

The awareness campaign team is especially grateful to the Cakaudrove Provincial Office for their continued support for the awareness campaign and for releasing their staff to participate.

Funding for the initial consultations and *tikina* level awareness campaigns have been provided by the Fiji government through the Ministry of Primary Industries.

INTRODUCTION

BACKGROUND

Fiji's native iguanas, *Brachylophus* sp.

Fiji has three native species of iguanas (iguanas that arrived in Fiji before humans arrived in Fiji) belonging to the genus *Brachylophus,* of which two are endemic (found only in Fiji and nowhere else in the world).

These two endemic species are the Fiji crested iguana (*B. vitiensis*) and Viti banded iguana (*B. bulabula*). The Viti banded iguana is found on the islands of Viti Levu, Kadavu, Ovalau, Gau, Viwa (Tailevu), Vanua Levu, Matagi, Qamea, Taveuni, and Laucala - a distribution range which overlaps with that of the introduced American iguana.

American iguanas, *Iguana iguana*

The American iguana (*Iguana iguana*), more commonly known as the green iguana was first recorded in Fiji in the year 2000, on the island of Qamea in the Cakaudrove Province. In 2009, they were reported from and confirmed to be present on Laucala Island, Matagi Island and Taveuni Island. In February 2010, it was reportedly brought into Viti Levu from Taveuni/ Vanua Levu. The American iguana is native to (originally from) South America, and is reported to have been brought into Fiji by a foreign national.

According to a survey report by the University of the South Pacific (Naikatini *et al.,* 2010), the American iguana (*Iguana iguana*) was introduced onto the island of Qamea, Cakaudrove Province in 2000. The source of these introduced iguanas is unknown at this stage.

The first site of introduction was Yaroi Estate, located on the south west side of Qamea Island. Five surveys have been conducted since the first report to the Fiji Department of Quarantine in 2002. The first was undertaken by the Fiji Quarantine Department, followed by the University of the South Pacific (2003), University of the South Pacific with the Department of Environment, Department of Biosecurity Services, National Trust of Fiji (2009), Fiji Department of Biosecurity Services (2009) and Dr. Rob Fisher and Dr. Peter Harlow (2010).

In early 2010, visiting herpetologists, Dr. Rob Fisher and Dr. Peter Harlow recorded breeding populations on Qamea Island and Matagi Island. They concluded that the American iguanas were being transferred between different islands by local hotel staff who thought that they were the endemic Viti banded iguanas (*B. bulabula*). They suspected that the American iguana has also been taken to the main island of Vanua Levu.

In March 2010, a report was lodged from an inter-island ferry service on the release of the American iguana into Viti Levu by a passenger onboard the vessel.

The Community Outreach Programme on the Introduced American iguana, *Iguana iguana* has four key objectives:

- A Community Outreach Program is required to improve community awareness and understanding of the risks in moving American iguanas between islands, and especially the potential for human introduction of American iguanas to Laucala, Taveuni or other islands.
- To encourage support and participation of the local communities to report all sightings of American iguanas to the American iguana Eradication Campaign Taskforce.
- To prepare local people for the upcoming eradication programme.
- Gather and record information from all surrounding areas as to the actual extent of American iguanas on these two islands.

3.0 Scope of the report

This report highlights the results of an initial consultation awareness campaign with the Cakaudrove province's *tikina* meetings on the island of Taveuni and Qamea from the 25th – 30th June 2010:

- Key issues raised by the community members in relation to:
- The biosecurity promulgation
- The American iguana

Key issues raised by the awareness team in relation to:

- The biosecurity promulgation
- The stakeholders:
- Department of Biosecurity
- Fiji Police Force
- Department of Agriculture.

4.0 Awareness campaigns in the *tikina* Cakaudrove, Laucala, Wainikeli and Vuna

The NatureFiji-MareqetiViti team was led by Mr. Waisale Mataitoga of Somosomo Village and Kelera Macedru (NFMV project officer). Mr. Mataitoga and Ms. Macedru were joined by Sipiriano Qeteqete of the National Trust of Fiji.

Consultations by Mr. Mataitoga led the Roko Tui Cakaudrove, Ratu Aca Mataitini to grant the awareness team fifteen (15) minute sessions in the province's monthly *tikina* meetings for the *tikina* Cakaudrove (25th June, Lovonivonu Village, Taveuni); Laucala (28th June, Kocoma Village, Qamea island); Wainikeli (29th June, Naiviivi Village, Qamea island); and Vuna (30th June, Kanacea Village, Taveuni).

4.1 Objectives of the awareness campaign

Purpose of this initial consultation awareness campaign was to inform various *turaga ni koros* on the following issues:

- The formation of the American iguana Eradication Campaign Task Force and its roles;
- The biosecurity promulgation on the American iguana and the islands of Taveuni, Qamea, Laucala and Matagi;
- The key physical differences between the introduced American iguana (*Iguana Iguana)* and the native Banded Iguana (*B.s fasciatus)* and/or the endemic Viti banded iguana (*B bulabula);* and
- Gather any other information on the American iguana; and
- To confirm the follow-up village level awareness workshop dates and venues.

Posters, flyers and an information sheet (Appendix 1) were distributed during the awareness campaign.

5.0 Results

The *tikina* meetings were facilitated by the Assistant Roko of the Cakaudrove provincial council. Other participating organisations other than the *turaga ni koro* were:

Yellow Ribbon (Fiji Army); The Fiji Police Force; The Dept. of Agriculture; FIMSA, PWD, Health Inspector; Copra Mills of Fiji Ltd, National Trust of Fiji and NatureFiji-MareqetiViti.

5.1 Summary of the Tikina Meetings

Venue	Comments
Lovonivonu Village	Question was raised as to whether it is possible to eat the iguana? People were familiar with the American iguana as it was also caught at Lovonivonu, year 2009?
Kocoma Village	No questions raised during presentation at this *tikina* meeting Individuals present unanimously agreed on having awareness campaigns held in their respective villagers Police officers were invited to attend the awareness campaign, to enforce the penalty on those caught with an American iguanas
Naiviivi village	Individuals present unanimously agreed on having awareness campaigns held in their respective villagers *Turaga ni koro* from Naiselesele, questioned on the timing of the awareness times at Naiselele. Time was reposed to by Waisale to be from 9am-12pm
Kanacea village	Question raised was if there was any feedback from NatureFiji –MareqetiViti on the awareness on the Taveuni Awareness Campaign held at Vuna in 2009. Dates on proposed awareness dates in Vuna, 16th- 20th of August will be confirmed via the provincial council.

5.2 Visit to Yaragau, Qamea

The awareness campaign team also visited Yaragau on Qamea island to witness the site at which the American iguanas are said to occur in great numbers. Below is an account of the trip.

- Visited Yaragau with the *turaga* ni Koro of Naiiviivi village, Jerry Suruwai , who in 2002, reported on the sighting of the American iguana.
- The American iguana is locally termed *'moko ni yaroi'*
- *Yaragau* an area estimated to be 2 km from Yaroi Estate, 2 minutes boat ride from Naiiviivi village. A pond at the Yaragau was said to be the place where the American iguana breeds. *(See image next page).*
- Burrows observed on the banks of the pond were assumed to be that of the American iguana.
- Average depth of each burrow was estimated at 20cm. *(See image next page).*
- Claw marks were observed around the burrows.

- Sandy areas near the pond revealed more than 10 burrows after less than a minute of searching.
- A *Tavola* tree beside the pond was said to be where the American iguanas usually aggregate. A photograph of an American iguana on this *tavola* tree was taken.
- Arthur Mitchel of Yaragau reported that the American iguanas are also seen on other trees at the Yaragau site. The leaves of these trees also appeared to have been eaten.

5.3 Informal Interviews:

Informal interviews were also made with locals. Below are some accounts of these interviews.

1. ARTHUR MITCHELL

- Arthur is the caretaker at Yaragau where American iguana have been known to breed
- Reported to have counted 40 American iguanas at one time inside the pond.
- Observed American iguanas on *Tavola* tree present near the pond
- Observed American iguanas trailing behind him while cutting grass at the compound
- Has taken American iguanas to nearby island resort, where visitors are reported to have been excited to see the reptile.
- States that the American iguana is a very calm reptile, kept them on his back when he last visited a nearby resort.
- Arthur stated that once the leaves all fall off, it will be easier to see the American iguanas on the branches of the *tavola* tree.

2. LUISA SURUWAI

- The American iguana escaped into the sea when chased by the *turaga ni koro* Jerry Suruwai at Naiiviivi village
- It was observed to be crawling on the ocean floor at an estimated distance of 40m away from land, staying under water for 15-20 minutes without re-surfacing.
- The American iguanas was then caught and given to the Police Department at Waiyevo, Taveuni.
- The size of the American iguanas was an estimated 13cm long, as her hand gesture showed suggesting that the American iguanas was an adult size.

3. CHALE TURAGATECI

- Captured two adult sized American iguanas in a cage at his house, one broke free the second died after one week
- The American iguanas were fed with cabbages and other leafy vegetables during its captivity
- Chale remarked that it is a very calm reptile, that when aggressive its dorsal spines would stand. This is then calmed by the individual holding the reptile, by gently rubbing the reptile with their hands.

6. Discussion of results

6.1. THE ATTENDEES OF THE MEETINGS DID NOT KNOW OF THE EXISTENCE OF THE AMERICAN IGUANA ERADICATION CAMPAIGN TASK FORCE OR THE BIOSECURITY PROMULGATION AND ITS PENALTIES.

This indicates that there is a need for another press release by the AIEC on the biosecurity promulgation. The fact that the American iguana is still being taken between islands and being kept as pets is a clear indication of the ignorance of the general public of the threats these iguanas pose and the penalties of the biosecurity promulgation.

6.2. THE AMERICAN IGUANAS ARE INDEED SPREADING AND BREEDING RAPIDLY.

The fact that the American iguanas have begun breeding and are residing on some trees is already evidence of the type of damage that they can cause if the population explodes. The currently small population are causing little impact for now. This will worsen with more adults. The encounter of a large number of burrows within only one minute of observation is already worrying.

7. Recommendations for the follow-up awareness campaigns

- Flyers and posters produced for the American iguana awareness campaign be translated into Fijian; and printed as A3 sized posters.
- Flyers and posters to contain the following information:
  - Threats posed by the American iguana
  - Key differences between the American iguana and Fiji's native iguanas
  - Key information to record when an iguana is sighted.
- It is important to note the differences between the American iguana and the native iguana. There have been perceptions by locals that the native iguana does not have a dewlap; that the ears of the American iguana do not have a hole while that of the banded iguana does. (They most likely think that the large scale below the eardrum of the American iguana is its eardrum.
- Research on the damage caused by the American iguana should be conducted as soon as possible. This information must be disseminated to the local communities who do not see the reptile as a threat. American iguanas are currently perceived to be a tourist attraction.
- Questions during *tikina* meetings were more focused on improving income generating sources like acquiring licenses to fish, and receiving dalo plantains from the Agriculture department. A thorough research on the damage caused by the American iguanas in countries it is considered to be an invasive species conducted, and highlighted during the awareness campaign. The American iguana is a potential threat to the taro industry of Taveuni.
- Hotels/Resorts in the Cakaudrove province should also be targeted for awareness as the hotel workers are the most likely vector of the young American iguanas. The Tourism industry has also been greatly affected in countries where the American iguana has been introduce.
- Clarification needs to be made on the alternative penalties for those who are caught with the American iguana but are unable to pay the fines. What happens when the biosecurity promulgation expires?

8. Issues to be clarified by the AIEC task force.

- The roles of the temporary biosecurity officers need to be clarified. Do they have the power to confiscate captured American iguanas? If so, where would these be taken? Who will take care of them/ get rid of them?
- What is the role of the police in the biosecurity promulgation, if any?
- When will the eradication begin?
- Who is the biosecurity representative on Taveuni island? Will he/she be part of the awareness campaign? Has he/she been briefed on the project?
- What are the alternative penalties for being in possession of the American iguana?

9. Upcoming village-level workshops

The tentative programme and village workshop schedules are below.

Dates	Venue
TIKINA LAUCALA	
12/07/10	Dreketi
13/07	Kocoma (am) Ucunivatu (pm)
14/07	Togo (am) Onadere (pm)
TIKINA WAINIKELI	
15/07	Naiviivi (am) Nadilo (pm)
16/07	Vatusogosogo (am)
19/07	Lavena Village
20/07	Korovou-Bouma Village
21/07	Vidawa
22/07	Waitabu
23/07	Wai
26/07	Naselesele
27/07	Qeleni
28/07	Navakacoa
29/07	Yanuca Is

References cited

Naikatini. A., Niukula, J, Raiwalui, V., Tawaka, S and Qeteqete. S. September 2009. Alien

Iguana Survey, Qamea Island, Cakaudrove Province, Fiji. Unpublished report prepared for the Department of Environment, Fiji Islands

APPENDIX VII: AWARENESS CAMPAIGN POSTERS

B

REPORT ON THE AMERICAN IGUANA ERADICATION WORKSHOP, NAIVIIVI VILLAGE, QAMEA ISLAND

AMERICAN IGUANA ERADICATION CAMPAIGN TASK FORCE

SEPTEMBER 2010

[ANNEX 2]

MR WAISALE MATAITOGA SOMOSOMO VILLAGE, TAVEUNI

BACKGROUND

The American iguana Awareness Programme was undertaken between 12-30th July 2010. We were blessed by the presence of Mr. Kisoko Cagituevei from the Prime Minister's Office and the Roko Tui Cakaudrove, Ro Aca Mataitini during the second week of the awareness programme. Their presence elevated our programme when they gave us their full support and this was reflected in the large attendances.

During the process of the Awareness Programme, the need for a workshop for local stakeholders geared towards the eradication of this Iguana was discussed. The idea of the workshop was approved and the date set for the 10th September, 2010 to be held at Naiviivi Village.

I was delegated on Monday 9th August, 20 10 to convene a date and venue for the workshop. The workshop to be geared towards the eradication of the reptile (American iguana). After reaching out to th Turaga ni Koros and heads of the Tikinas and Mataqali, they showed their support by approving on the dates and venue. The Provincial Office, Agriculture Department and Police also showed their support by their presence.

This report summarises the outcome of the workshop.

PREPARATION

- Organising the date, venue and number of participants from the two Districts of Laucala and Wainikeli.
- Compile the budget for the workshop i.e. transportation and. catering etc.
- Inviting other resources – Assistant Roko Tui Cakaudrove, Agriculture Department Staff and Fiji Police Force.

PROGRAMME REPORT

In Attendance: Dr. Peter Harlow, Mr Theo Blossom, Agriculture Officer – Mr. Rohit Lal, Veterinary Officer -Mr. Taniela Ravubula; Police Officer – Mr. Jone Natuwawa and 50 participants from all the villages and settlements on Qamea and from Wainikeli and Bouma on Taveuni.

The Workshop was opened by the Assistant Roko Tui Cakaudrove based at the Somosomo

Provincial Office, Mr. Aloesi Rasaciva. In his opening speech he emphasised the importance of the collaborative work of the villages and Government in the battle to eradicate the alien American iguana from their shores.

The presence of the two Herpotologists Dr. Peter Harlow from Australia and Mr. Theo Blossom from United Kingdom provided a good indication of the concern on this issue by the Government and NatureFiji-MareqetiViti. The result of their observations and recommendations will enhance the eradication work which should eventually fall back on the villagers to implement.

There was extensive discussion on all issues pertaining to the distribution and abundance of the American iguana and questions were answered to follow up the awareness presentations.

The concluding activity of the workshop was for the participants to witness the dissection of the two female Iguanas recently captured on Matagi and at Niubalavu. The participants were amazed by the number of eggs which the iguanas were about to lay; and this made it clear to all that if eradication is not implemented soon their beaches and environment will be infested with this unwelcome American iguana. That, itself, is the climax of the workshop.

BOSE NI TIKINA

The recommendations of the workshop will be tabled at the coming Bose ni Tikina, i.e. Laucala District 21st September, Wainikeli District 22nd September, emphasising the importance of the collaborative effort of all stakeholders in the fight to eradicate the American iguana from their environment.

RECOMMENDATIONS FROM THE WORKSHOP

The following recommendations were made:

1. Biosecurity - Enforcement of the promulgation – clarification of laws and empowerment of Turaga ni Koro and Ministry of Primary Industries officers to confiscate and eradicate – construction of holding cages in the 2 villages of Naiiviivi and Togo

2. AWARENESS PROGRAMME

Awareness billboards at all landings (about the threat posed by the Iguana and the legal provisions of the Iguana Promulgation)

3. WORKFORCE

Formation of Iguana eradication team in the 2 villages of Naiiviivi and Togo – to provide the link between the villagers and American iguana Task Force/Biosecurity/NFMV

4. REWARDS - Provision of a reward for villager helping in the eradication of the American iguana. If need be any form of reward can be directed towards village institutions (school, electricity fund etc.) rather than to individuals. I.e. making it a cooperative task.

ACKNOWLEDGEMENTS

The workshop was completed with great satisfaction to me and I would like to acknowledge the following officials for their .invaluable contributions:

- Provincial Office – The Assistant Roko, Somosomo, Mr. Aloesi Rasaciva and his staff
- Agricultural Office – Mr. Rohit Lal and his staff
- Herpetologists – Dr. Peter Harlow and his assistant, Mr. Theo Blossom
- Tui Laucala – For his role as the Traditional Head of the Laucala District
- Tui Korovatu – Traditional head of the Vanua Naiviivi
- Turaga ni Koro, Naiviivi – Mr. Surumi for his invaluable services which helped in the smooth running of the entire programme.

C

30 Days on Qamea Researching the Invasive American Iguana *Iguana iguana*

THEO BLOSSOM

[ANNEX 3]

Summary

The American iguana *Iguana iguana* was introduced to Qamea ten years ago. There are confirmed breeding populations on Qamea and Matagi. There have been other sightings on the island of Laucala and Taveuni. Due to the potential harm this invasive species could have upon Fiji's endemic Iguanas *Brachylophus sp.*, Fiji's tourism industry, vegetable gardens of the villages and Fiji's agricultural industry the Ministry of Primary Industries has set up an American iguana Eradication Campaign Task Force (AIECTF) and is formulating an eradication plan.

I spent 30 days on Qamea researching the American iguanas. During my stay on Qamea I saw 11 iguanas (two of which were captured but escaped). Local villagers caught four other American iguanas, three on Qamea and one on Matagi Island. Information I have collated in this report is from my observations and experiences of the local people. This report has contributed extended field observation and information needed by AIECTF herpetologists, Dr Peter Harlow and Ms Nunia Thomas, to make recommendations for the Eradication Strategy.

Introduction

Reports of a large alien lizard on the island of Qamea were first reported in 2002 by the Turago ni Koro of Naiviivi village, Jerry Surumi.

Local villagers witnessed Mr Ken Honning releasing roughly 10 lizards on his property at Yaroi Estate in 2000.

A survey in 2003 by Clare Morrison and Alice Heffernan was not able to confirm which species of lizard was being seen by the locals.

It was not until 2008 that Miss Alice Heffernan of Matagi Island Resort actually photographed a captured specimen, which was identified as a Green Iguana *Iguana iguana* by Dr. Peter Harlow of Taronga Zoo (Sydney, Australia).

NB: The Green Iguana has been given an alternative common name of 'American iguana' to distinguish it and not confuse people with the native Fijian Iguana's *Brachylophus sp.* which can also be green in appearance.

In 2009 Jerry Surumi reported at the Wainikeli District meeting in Taveuni that the iguanas were extending their range on Qamea and affecting the livelihoods of the local villagers. In response to this the Department of Environment funded a three day survey carried out by biologists from the University of the South Pacific and National Trust of Fiji personnel. No American iguanas were observed but anecdotal reports were collated from villagers who believed they had seen them in mangroves and coastal forest of Qamea. Two live specimens caught by villagers were taken to Suva (Naikatini *et al.* 2009).

In early 2010 Dr Rob Fisher and Dr Peter Harlow recorded breeding populations on Qamea and neighbouring Matagi Island. They suspected that the iguanas had been transported between islands by locals. The presence of the Fijian Banded Iguana *Brachylophus bulabula* on Qamea was also confirmed.

Confirmed sightings of the American iguana suggest that they are restricted to the north west of Qamea, around the Navivii bay area. There have also been 2 or 3 recorded sightings on the north coast of Qamea at Lali and Niubavu. There have been occasional sightings on Laucala Island (one adult captured in 2008), and 4 or 5 sighting on Taveuni in 2010.

In July 2010 a Community Outreach Programme on the Introduced American iguana was undertaken by Kelera Macedru and Waisale Mataitoga of NatureFiji-MareqetiViti. Following a presentation at four Tikina meetings, this programme delivered workshops in Qamea, Matagi and Taveuni educating on:

1) The potential harm the American iguana could do to

   a. Fiji's endemic Iguanas

   b. Fiji's tourism industry

   c. The vegetable gardens of the villages

   d. The agricultural industry of Taveuni

2) The biosecurity protocol that had been put in place to ensure no further spread of the American iguanas

3) How to identify the differences between a juvenile American iguana, and an adult Fijian Banded Iguana.

The purpose of the current study was to spend a significant amount of time on Qamea Island in the areas where American iguanas had been reported to live by locals in order to gather key information on their behaviour, such as:

1) Location

2) Extent of spread

3) Preferred feeding and foraging sources

4) Breeding locations

5) Effect upon local people

6) Possible means by which to capture the animals

The information gathered was to help build a more complete picture of the situation for experienced herpetologists to use and propose a suitable eradication plan to the Fijian Government's Department of Agriculture.

Methodology

For the majority of the study (12/08/10 – 10/09/10; Total = 30 days) I was based in Naiviivi village on Qamea, living with the family of Jerry Surumi. From this location I was able to access easily areas where there have been reports of the American iguanas.

For the final 10 days (1/09/10 – 10/09/10) of the study I was joined by Dr. Peter Harlow and for 3 days (1/09/10 – 3/09/10) by Dr. Robert Johnson, a Veterinary Officer from Taronga Zoo. Myself, Dr Johnson and Dr Harlow were all given rights of temporary biosecurity officers in order to carry out our research.

All searches for American iguanas were opportunistic, searching all suitable habitat. Information from the locals formed the rationale for where to search for the iguanas and with whom to initiate further conversation in order to gain more knowledge. Comprehensive notes were taken throughout the duration.

American iguanas caught during this period were photographed, biometric data recorded, killed and then a brief post-mortem was carried out in order get blood and intestine samples for further laboratory pathological analysis.

Results

Table 1 Summary of work undertaken and significant observations and information gained

Date	Observations
14/8/10	Visited Wainimaqai Resort briefly and met management. No iguanas seen there. Visited Matagi Island. Neither owners nor management there to talk to. Visited Niubavu settlement. Met Stan Mitchelle. He has not seen any more iguanas on his property since the last hurricane (April, 2010). Not convinced he knows the different between American and Fijian Iguanas. Visited Qamea Beach Club briefly and met management. Iguanas have been seen sunbathing on Drala *Erythrina variegata* and Tavola *Terminalia catappa* trees in grey water soak away of resort.
16/8/10	Spent day observing and searching at Yaragau. Sia Mitchell (wife of caretaker) said they regularly see them on lawn and sunbathing on trees during hottest parts of the day. Iguanas particularly like eating freshly cut grass. American iguana spotted high up in Tavola tree overhanging pond. See appendices A and B. Only seen because Siti Surumi climbed the tree. Observed sunbathing for 2 hours, did not see it eating the Tavola leaves.
17/8/10	Walked around mangrove bay from Naiviivi Village to Yaragau. Searched suitable trees and mangrove areas. In Saravi settlement, owner Jonnie said he had not seen iguanas here since before the last hurricane (April, 2010). Locals often call the American iguana the Marine Iguana because they frequently see it swim in the seas when they escape capture. Siti Surumi climbed same Tavola tree at Yaragau to explore further. Four American iguanas spotted; 1 adult and 3 juveniles (estimated 2 years old) jumped out of tree (20–30 ft) into pond below. Evening grog session in Naiviivi. I was questioned if iguanas dangerous to people, if they eat meat, are they edible. Less seen since hurricane.
18/8/10	Searched mangroves around Navivii Bay in kayak at high tide. No iguanas seen or heard jumping into water.
20/8/10	Extensive search of Qamea Beach Club resort and trees where iguanas have been seen before. Nothing seen.
21/8/10	Extensive search on foot of mangroves in Navivii bay, climbing through trees hoping to disturb iguanas and hear them jumping into water below like reports from locals. Nothing heard or seen. Night time search at Yaragau with flash lights to try and see iguanas up Tavola tree where seen before. Very heavy rain, nothing seen.
23/8/10	2 small iguanas found in Tavola tree above pond at Yaragua. Left them undisturbed to see if they can be easily seen with flashlights at night time. Returned to Yaragau with lights. American iguanas don't stand out easily with flashlights at night time like Fijian Iguanas do. A third spotted in same tree. Two American iguana juveniles from Tavola tree caught and returned to Navivii to be kept captive. See appendix D.

24/8/10	One juvenile that was caught escaped when Siti was handling it in the morning. Due to interest from villagers I hid the second one under the house to be left alone and make sure it also was not interfered with. Extensive search of suitable trees along the coast of Navivii village to Vatusogosogo settlement. None seen. One juvenile spotted up Travloa tree at Yaragua in late afternoon.
25/8/10	Spoke with Arthur Mitchell, caretaker of Yaragau. He has seen iguana digging burrows. Often sees them sunbathing on trees and rocks. Some quite approachable and let him touch them. Searched trees between Yaragua and Yario and Saravi, none seen.
26/8/10	Walked over ridge from Naiviivi to Niubavu. Workers there said they sometimes see them on mango trees on site. Searched mango and tavola trees, none seen. Walked round coast at low tide to Lali settlement. Searched suitable trees. None seen. Walked backed to Naiviivi over ridge.
28/8/10	Large gravid female (# 1) caught by Arthur Mitchell at Yaragau. Lots of interest from villagers when we returned with iguana. No suitable cage to house it so made a harness and released up Mango tree on a leash. Asked Jerry to tell villagers to leave well alone. Found out someone had disturbed the juvenile iguana I had placed securely under the house and it had escaped. No one owned up to it.
30/8/10	Walked from Wainimaqai Resort to Nadilo where there had been reports of a large iguana skeleton. Turned out to be dog skull and vertebrae. See appendix E. No reported sightings here.
1/09/10	Dr Peter Harlow and Dr Robert Johnson arrived. Iguana (# 2) caught by staff of Qamea Beach Club at the far NW end of their beach. Search of Yaragau and Yario, nothing seen.
2/09/10	Iguana # 1 and # 2 killed and blood and intestine samples taken. See appendices F, G and H. Visited Nukubalavu settlement, no iguanas have been seen by residents.
3/09/10	Met with security of Laucala Island Resort, they claim to have not seen any iguanas. Met Alice Heffernan at Matagi Island Resort. Not seen any iguanas since March. Dr Robert Johnson left.
4/09/10	Walked around Navivii Bay. Jonnie from Saravi settlement reports seeing two large Iguanas on fallen tree between Yario and Yaragau frequently.
6/09/10	Walked around Naiviivi Bay to Yaragau. Spotted large female on fallen tree Jonnie spoke of. Failed attempt at noosing it. It jumped in the sea and swam away. Searched Yaragau. None seen. Tail marks observed in sand leading to hole.
7/9/10	Visited Matagi Island. Walked around Island, none seen. Caught boat to Lali and walked back to Naiviivi over ridge.
8/9/10	Searched Yaragau and Yaroi. Iguana #3 caught at Matagi Island by resort worker. We collected and returned to Naiviivi.
10/9/10	Workshop Meeting in Naiviivi led by Waisale Mataitoga. Iguana #4 caught at Nuibavau and brought to meeting. Both Iguanas #3 and #4 killed and blood and intestine samples taken. See appendacies I and J.

Table 2 Information recorded of American iguanas killed

	Iguana #1	Iguana #2	Iguana #3	Iguana #4
Capture info	28/8/10 by Arthur Mitchelle at Yaragau	1/9/10 at Qamea Beach Club	8/9/10 at Matagi	10/9/10 at Niubavu
Gender	Female	Female	Female	Female
SVL	380mm	316mm	392mm	254mm
TL	802mm (incomplete tail)	1085mm	1390mm (incomplete tail)	380mm
Weight	2250g	1256g	2283g	665g
Egg Number	55	34	52	20

SVL = snout-vent length TL = Total length (body+tail)

Discussion

In 30 days, I saw 11 iguanas in their natural habitat. Ten of these sightings were animals high up in a tavola tree at Yaragau. The other was seen close by between Yaragau and Yario. Many other species of tree were searched in the same and other suitable areas but no iguanas were seen. It is probable that some of these were repeat sightings of the same lizards. No iguanas were actually seen eating tavola leaves. I am unaware of what their favourite leaves are to eat.

Figure 1. Map showing island of Qamea, Matagi and Laucala, highlight areas searched and where American Igunanas were seen and caught.

All sightings during this trip came about because of information collected from local people on where to look. As with many reptiles, the chances of finding iguanas can be increased by looking in the right habits, near preferred food sources, suitable time of day and when weather conditions are most favourable. The local people live within this habitat and know this information. I believe it is therefore important that they are central to any successful eradication programme.

It is hard to find iguanas in their natural habitat. Going searching for iguanas can be a labour intensive task, even with all the information mentioned above you often do not see them. They have evolved over millions of years to be elusive and therefore hard to capture. It is my opinion that to employ someone to search actively for the American iguana would be a waste of money. It would be better to use the eyes and ears of the local people who live and work in the habitat to provide information.

Four American iguanas were captured by local people and either brought to me or we collected them after they had phoned Jery Surumi in Naiviivi village. It became clear that having a local man, in this case Jery (the Turaga ni Koro) as the person to contact when iguanas are seen or captured, is a good system.

All four of the adult American iguanas captured were gravid females, presumably more easily caught because they were searching for suitable nesting sites. Post mortems showed that the eggs were ready to be laid within days or weeks. This indicates when their breeding season is around August, September and October, but it could be possible that they lay a second clutch each year. Further research is needed to explore this. Concentrating on locating active and suitable nesting sights may be a good means by which to capture and/or control American iguanas numbers. Their need to find open and well sunlit areas makes gravid females vulnerable when they come to the ground.

A total number of 161 eggs were found in the four individuals dissected. Fifty five eggs found in one alone. With very few natural predators and numerous potential food sources it is clear the American iguana population could grow exponentially.

It is very hard to keep captive animals such as large iguanas in villages with out local curiosity resulting in distress for the captive animal, even harm and accidental release. The two juveniles that were held captive in Naiviivi escaped. One escaped because a local did not know how to correctly hold the iguana and it escaped by loosing its tail. Fijians are used to holding their own native iguanas by their tails as they do not lose them by means of an escape mechanism, unlike American iguanas. Fijians need to be shown how to hold American iguanas differently to their native Fijian Iguanas. The second escaped because local people wanted to look at the iguana and did so without asking my permission. I presume they accidentally let it escape whilst meeting the needs of their curiosity. Suitable padlocked enclosures need to be made if animals are to be temporarily kept in villages. Individuals in the village must also me made aware of how to care for the animals and ensure their welfare.

I found the best method for seeing iguanas was to climb suitable trees (as shown to me by local people who had seen them there) and look down on them from above. From this position you can either catch them with your hands in the tree or force them to jump from the tree to be caught by someone waiting below. It should also be possible to noose them with a long pole whilst in trees. Many that are seen up in trees are far out of reach and the best means of killing the iguana would be by shooting it. The idea of a trained firearms person should be explored for such scenarios.

It was hoped that searching at night time, using large flash lights, would make finding the American iguana easier, as is the case with the native Fijian Iguana species. This is not so, their belly colour does not reflect the light well and therefore make them stand out. It is also probable that the tavola

leaves that the iguanas were sitting on covered them well, making the flashlight method unsuitable in this instance. Even searching in a tree where we knew there were two juvenile iguanas, it was very hard to locate and see them at night.

Several local people commented that the number of iguanas they have seen has either dropped or completely stopped since the hurricane that hit the island in April 2010. Further research is needed to explore these reports. It is possible that the iguanas were blown from the trees and killed or it may be that there was a major food shortage for too long after the hurricane which affected the iguanas numbers.

There were reports and observations of locals being very scared of the iguanas. Some reported this stopped women going fishing around the mangroves. Many locals asked if the iguanas were dangerous to humans and ate meat. America Iguanas are not dangerous to humans and would only attempt to bite, scratch or whip with their tail if they are threatened. This shows us that the information presented at the awareness workshops did not reach all members of the communities. In Nadilo is was believed that a large dog skull and vertebrae were that of an American iguana, so it is not surprising they should be scared of a reptile potentially the size of a large dog. It is incorrect opinions likes these that need to be addressed through education if the local people are going to be able to work towards eradicating the American iguana without being scared of them.

Some locals asked what reward they should get for capturing American iguanas or for providing information of their whereabouts. I see this as the most difficult part of proposing an eradication plan. Local people need to be motivated to report sightings but making the iguanas 'valuable' provokes many possible problems:

It may result in locals capturing and 'farming' the animals, possibly even taking them to other islands to do this.

Locals could attempt to protect nest sites if they know that they can receive a certain amount of money for each iguana they report or hand in.

Actively hunting iguanas for a cash reward could elicit a mob behaviour of many people chasing and scaring the iguanas into the forest without actually catching them. These creatures will learn avoidance behaviour very quickly, making them even harder to catch in the future.

Some kind of reward is needed to ensure information is given, as I'm sure many iguanas currently seen, go unreported. I am very sceptical of what effect putting a monetary reward on the iguanas will have. A reward which benefits the community as a whole may be a successful motivator without evoking problems of jealousy between individuals or settlements which may have better access to iguanas. For example the money could go to the local primary school which would benefit all members of the community. As a foreigner, I am unsure how to tackle these cultural difficulties.

The workshop carried out on the 10/09/10 seemed to be run very well and evoked a lot of interest from local people. Fijian was mainly spoken and therefore I am unaware of a lot of the details discussed. I was worried that people attending the meeting would return to their respective villages and report things discussed as 'final decisions' with regards to the eradication plan. For example people at the meeting suggested that a $100 FD reward should be given for information leading to the capture of an American iguana. I would not be surprised to hear of iguanas being caught and people demanding their reward before any eradication plan has been proposed by the Ministry of Primary Industries. Waisale Mataitoga's full report of discussions at the workshop will be a useful addition when planning an effective eradication plan.

Recommendations

NB: Using information I gathered, which is presented in this report and that of his own extensive experience in Fiji with native and the American iguanas, Dr Peter Harlow has submitted recommendations for an eradication plan to the Fijian Government Department of Agriculture on the behalf of NatureFiji-MaraqetiViti.

Below are my recommendations based on my time and observations on Qamea:

- The most important thing is that no more American iguanas are transported off the islands of Qamea, Matagi and Laucala. Educational bill boards to highlight the biosecurity protocol should be placed at the beach landings that service these islands.
- The use of locals in an eradication plan is paramount. Due to the opportunistic way in which iguanas are seen, if anybody is likely to see them then it is the people who live there.
- Several localised Biosecurity officers, who can be contacted with information on sightings and captures, should be assigned. These people should receive training on how to identify, capture and humanely kill the iguanas.
- If the animals are to be temporarily kept in villages, suitable secure cages should be based in the village where a Biosecurity officer is based.
- Many iguanas that are seen are up in trees and far out of reach. The best means of killing these iguana would be by shooting them. The idea of trained firearms people should be explored for such scenarios.
- Further education and awareness is very important so people know how to identify the differences between Fijian and American iguanas. It is important to stop the further spread of American iguanas to other islands through education programmes.
- I do not know what to recommend on how to reward people for information or captured iguanas. In an ideal world educating the people that the spread of the American iguana is bad for their livelihood, island and Fiji as a whole, would provide them with the intrinsic motivation needed.
- More information is needed on the iguana's behaviour. Capturing individuals and fitting them with radio transmitters and using telemetry equipment would provide useful information on their behaviour.
- Information from the workshop should also be taken into consideration as an eradication plan is formulated.

Acknowledgments

I would like to thank the following people for assisting me with this project:

- Jery Surumi and his family.
- The people of Naiviivi village.
- Waisale Mataitoga and his wife.
- Dr. Peter Harlow and Dr Robert Johnson, Taronga Zoo, Australia.
- Dr. Dick Watling, NatureFiji-MaraqetiViti, Fiji
- Ken Sims, Thrigby Conservation Fund, UK.
- JJB and JRE.

American iguana up Tavola tree at Yaragau.

Pond at Yaragau. The large Tavola tree to the right is where all but one of my sightings were.

Reported original release site of the American iguana by Mr Ken Honning at Yaroi estate.

Two juvenile iguanas captured at Yaragau.

Man from Nadilo village with a dog skull and vertebrae. The villagers thought this was the skeleton of an American iguana.

Dr Peter Harlow shows Jery Surumi how to humanely kill an American Igunana with a cane knife.

Clockwise from top left: Dr Robert Johnson performs dissection on American iguana #1 revealing 55 eggs; Blood sample being taken from American iguana; Jery receives an American iguana from Nuibavau village; A large crowd gather to see the killing of American iguanas #3 and #4; Dr Peter Harlow shows a large female American iguana to intrigued children in Naiviivi village.

D

AMERICAN IGUANA ERADICATION PROJECT: HERPETOLOGISTS' FINAL REPORT

[ANNEX 4]

OCTOBER 2010

Executive Summary

The eradication of the illegally introduced American iguana (*Iguana iguana*) from Fiji requires a long term project involving good communications, awareness and participation from all the inhabitants in the areas of Qamea and Matagi Islands where this lizard currently occurs. Each iguana must be captured and killed, however due to the sparse population and excellent camouflage of this lizard, it is not possible to simply send in a team to catch and kill them all. The immediate and major priority for Fiji is to stop the illegal movement by humans of this iguana from Qamea and Matagi to other islands.

American iguanas in Fiji - Overview

American iguanas were illegally imported into Fiji and released on Qamea Island in 2000 (Naikatini *et al.,* 2009). Breeding populations now occur on Qamea and Matagi islands, while occasional adults have been captured or sighted on Laucala (one adult captured in 2008) and Taveuni (4 or 5 sightings in 2010).

On Qamea, most iguana sightings have been along 4 km of coastline around Naiviivi Bay, from the Qamea Resort and Spa to Naiviivi village. On 9 September 2010 a gravid female iguana was captured at Niubalavu settlement on the north coast of Qamea, which is about 3 km from Naiviivi Bay, across the island. Whether these two areas represent different breeding populations on Qamea, or are a single, continuous population is not currently known (See Fig. 1).

American iguanas breed rapidly (each female can lay 50-80 eggs), have no natural predators in Fiji to control their numbers, and are generalist herbivores that will eat all plants in Fijian gardens including dalo and cassava tops, bele, cabbage, yam vines and beans. If iguana numbers are left unchecked, food sustainability in Fijian villages will be at great risk in the near future.

American iguanas where they are not hunted become bold and inquisitive and some introduced populations have become major nuisances in suburban gardens, hotels and resorts (e.g. southern Florida and Puerto Rico).

American iguanas cannot be poisoned or easily trapped. The only way to reliably eradicate them is to capture and kill each one and to target nesting areas to destroy the females and their eggs. American iguanas cannot nest in the forest, they have to nest in open areas with good sunlight and suitable soil. Such sites will be limited and provide focus sites for eradication effort.

American Iguana Eradication Campaign – progress to date

(1) Public Awareness campaign

A public awareness campaign in Qamea, Matagi, Laucala and north Taveuni has been undertaken by NatureFiji-MareqetiViti on behalf of the American Iguana Eradication Campaign Task Force (AIECTF).

The campaign included:

Presentations and discussions at four Tikina meetings in June 2009;

Three weeks of presentations in 18 villages and settlements, July 12-29th

Visits to six resorts; and,

Presentations in three Secondary Schools and four Primary Schools.

It is considered that the 'affected' population is now in a good state of awareness with respect to the American iguana and the threat that it poses, the Biosecurity Promulgation and the work of the American Iguana Eradication Campaign Task Force.

A report on the campaign has been prepared and circulated (American iguana *Iguana iguana* Awareness Campaign in tikina laucala, cakaudrove and wainikeli. Kelera Macedru & Waisale Mataitoga, 16 August 2010).

(2) Scientific observations

An experienced biologist, Theo Blossom from London Zoo, UK was on Qamea for 30 days making field observations of the American iguana. Mr Blossom's report has been prepared and circulated (30 Days on Qamea Researching the Invasive American iguana *Iguana iguana*. Theo Blossom, September 2010).

The AIECTF herpetologist, Dr Peter Harlow was based on Qamea and visited Matagi and Laucala between 31 August and 10 September 2010. A previous report, with Nunia Thomas, has been prepared and circulated. (American iguana Project Progress & Outline Eradication Report, Peter Harlow & Nunia Thomas, 10 September 2010). Dr Robert Johnson, Veterinarian, Taronga Zoo examined four American iguanas in Qamea and others captive in Koronivia making pathology observations and a parasite baseline.

(3) American Iguana Eradication Workshop

A Workshop was held in Naiviivi Village, Qamea, on 10 September 2010 chaired by Mr Waisale Mataitoga of NatureFiji-MareqetiViti, to discuss with all local stakeholders a plan for the eradication of the American iguana. This was attended by Agriculture Officer Mr. Rohit Lal, Veterinary Officer Mr. Taniela Ravubula, Police Officer Mr. Jone Natuwawa and 50 participants from all the villages and settlements on Qamea and from Wainikeli and Bouma on Taveuni.

Waisale Mataitoga's report has been prepared and circulated (American iguana Eradication Workshop, Naiviivi Village, Qamea Island, 10 September 2010).

The four recommendations from the workshop were:

1. BIOSECURITY

- Enforcement of the promulgation
- Clarification of laws and empowerment of Turaga ni Koro and Ministry of Primary Industries officers to confiscate and eradicate
- Construction of holding cages in the 2 villages of Naiiviivi and Togo

2. AWARENESS PROGRAMME

- Awareness billboards at all landings (about the threat posed by the Iguana and the legal provisions of the Iguana Promulgation)

3. WORKFORCE

- Formation of Iguana eradication team in the 2 villages of Naiiviivi and Togo – to provide the link between the villagers and American iguana Task Force/Biosecurity/NFMV

4. REWARDS

- Provision of a reward for villager helping in the eradication of the American iguana
- If need be any form of reward can be directed towards village institutions (schools, electricity fund etc.), rather than to individuals, i.e. making it a cooperative task.

The eradication plan

THE CHALLENGE

American iguanas are mostly arboreal, well camouflaged and have excellent eyesight, and the ability to avoid detection high in the canopy. They are also excellent swimmers and a favourite escape manner is to climb a tree and drop into the water where they can stay submerged for an hour or more. American iguanas cannot be easily seen at night by torchlight, unlike Fiji's endemic iguanas. Experienced herpetologists, Theo Blossom and Dr Peter Harlow have spent a total of about seven man-weeks based at Naiviivi village searching for iguanas on an almost daily basis. During this time five iguanas were captured in the study area (four on Qamea and one on Matagi). All were caught by villagers who had encountered them while going about their daily work. None were found by Theo and Peter except where villagers had supplied information on recent sightings.

For this reason, a simple 'search, catch and destroy' approach would be inefficient and expensive to run irrespective of how many men were available. It would be very unlikely to be successful and would probably scare iguanas deeper into the forest and they would quickly become scared of humans and even more difficult to capture in the future. In the absence of hunting and predators, the American iguana easily becomes accustomed to humans and can be readily approached.

In both Qamea (the Naiviivi Bay area and Niubalavu settlement) and Matagi, the American iguana is now well established, there are likely to be many hundreds of juvenile iguana in the forest which are essentially invisible, with many fewer (mostly female) adults being noted as they prepare for and undertake breeding which consists of digging nesting burrows in the soil in open areas.

THE ERADICATION RESPONSE

We recommend that an eradication plan must make use of local village networks of 'many eyes' to report sightings of American iguanas to a local trained coordinator who can quickly follow up on the report, capture and kill it. The timescale for this to work is not months but likely of the order 3-5 years. Our recommendations are, in summary, set out in the following sections.

LOCAL PROJECT SUPERVISOR

A local Department of Agriculture Supervisor and Administrator for this project is needed; probably Agriculture Officer Mr. Rohit Lal and/or Veterinary Officer Mr. Taniela Ravubula as they are Taveuni based. This person would be make regular visits to Qamea and Matagi, maintain the American iguana data base and make regular contact with the local coordinators (see below) to supervise and pay them.

LOCAL BIOSECURITY OFFICERS

Appoint several local 'temporary biosecurity officers' to act as local coordinators of the AIECTF, two on Qamea (Naiviivi and Togo villages: we recommend the current Turaga ni Koro's in these two villages) and one on Matagi (we recommend Ms Alice Heffernan) . Each has a mobile phone and would be paid for each American iguana report that they investigated. They would need to keep detailed records for each report investigated.

TRAINING

The four coordinators will require training in biosecurity and also by a herpetologist so that they can make accurate records and distinguish the American iguana from Fijian banded iguanas. They will need to learn about capture techniques and the recording of basic post mortem data from dead American iguanas (see Appendix 1 & 2). Identifying and monitoring all the nesting areas will be a crucial requirement. All this data will be essential to tracking the eradication plan's progress.

REWARDS

A reward system will need to be set up for information leading to the capture of an American iguana. Currently on Qamea, sightings of American iguana go unreported. A small reward is needed to catalyse reports of all sightings to the local coordinator. The manner in which this is set up needs further consideration as the risk of making the iguanas 'valuable' is obvious. If villagers perceive the iguanas as valuable, this will encourage their capture and release on other islands, attempted captive breeding and protection of nesting areas!

In addition, if villagers are actively hunting for American iguanas for a cash reward, they are more likely to scare and chase them deeper into the forest and make them more wary of humans and much harder to catch in future. In those parts of Central America where iguanas are hunted for food, it is difficult to get within 200 m of an iguana as they become so wary of humans.

A reward for iguana sightings is the most difficult aspect of the eradication plan and needs careful consideration. The Qamea workshop on 10 September (see above) has made useful recommendations on this aspect.

NESTING AREA SURVEILLANCE

Locating all American iguana nesting areas and controlling the breeding is likely to be the key to eradication. American iguanas need to lay their eggs in a nesting burrow which is in an open, sunny location. Their eggs will not hatch if laid in a shady place inside the forest. Pregnant female iguanas move from the forest in late August to find open sunny sites such as Fijian gardens, resort lawns, settlement areas, etc. to find places to lay their eggs. The coordinators will need to develop an expertise in identifying these nesting areas and check on them often from late August to late October to capture breeding females and to remove and destroy eggs.

CONTINUING AWARENESS PROGRAMME & BIOSECURITY PROMULGATION ENFORCEMENT

There is a need to continue the awareness programme – initially Natewa-Tunuloa and the offshore islands together with the remainder of Taveuni. A media campaign should be initiated stressing the potential damage the American iguana can do to Fijian subsistence self-reliance at the village level. Enforcement is important and penalties MUST be applied where individuals are caught transporting or keeping captive American iguanas.

PROJECT TIME FRAME & RECORD KEEPING

Given the establishment, albeit limited, of the American iguana in the forests of Qamea, Matagi and potentially Laucala and N.Taveuni, this eradication plan will take of the order of 3-5 years and possibly longer. A central record keeping base is an important prerequisite, where all records of positive sightings or captures of American iguanas are kept. Exact locations and details of sightings or captures are needed and positive records must be distinguished from tentative sightings

OTHER INITIATIVES

Research – Telemetry to investigate American iguana movement, reproduction and feeding behaviour. This is suitable for a USP Biology Master's student.

Figure 1: Shaded areas on Qamea and Matagi Islands show where breeding American iguanas have been recorded up to September 2010. It is not known if the two breeding sites shown on Qamea are separate, or are one continuous population.

Figure 2: Crab hole at Yaragau, Qamea, being used by a juvenile American iguana. Note the obvious 'tail drag' mark left in the sand outside this burrow.

Appendix 1

AMERICAN IGUANA CAPTURE METHODS

HAND CAPTURE: Iguanas can sometimes be simply ran down and captured if in open areas on the ground, or knocked out of trees with sticks and grabbed.

NOOSING: Iguanas that allow close approach can be noosed using an 8 m telescoping fibreglass pole with a monofilament (50 -70 lb) fishing line noose attached to the end.

SNARES and NETS: Use monofilament noose snares or monofilament fish nets to target iguanas at their burrows. When an active burrow is located the mouth of a fishnet 'bag' can be pegged over the entrance, with a drawstring around the mouth which will pull tight when an iguana is captured.

NEST AREA IDENTIFICATION and SURVEILLANCE: This will involve locating, and then regular visits to, potential nesting areas and raking soil, checking tracks, searching for tail drag marks (see Fig. 2), setting snares, etc. Visiting female iguanas can be noosed, snared or shot here, and even if the female is not captured eggs can be located and destroyed.

Nesting burrows can often be located by the presence of unused nest holes abandoned by females in search of a better site. Using a thin stick or a stick with a 15 cm long, 3 mm thick metal probe on the end (similar to that used to locate sea turtle nests) the well camouflaged iguana nesting burrow can be located by the softness of the soil.

SHOOTING: Consider one local Department of Agriculture staff member to be trained in firearm safety and use. Iguanas may be sighted high up in a large tree (e.g. a 30 m lvi) or warily basking on the ground but can only be approached to within 40 or 50 m before fleeing into the forest or diving into the ocean. A .22 calibre rifle using subsonic bullets is ideal in these situations (40-grain (2.6 g) lead: .22 LR Subsonic).

Appendix 2

HUMANE EUTHANASIA OF CAPTURED AMERICAN IGUANAS:

Captured iguanas can be humanely killed by cutting off the head (decapitation) with a sharp knife or axe, followed quickly by severing (or crushing) the head through the brain.

This technique is recommended in the American Veterinary Medical Association (AVMA) Guidelines on Euthanasia, 2007 (http://www.avma.org/issues/animal_welfare/euthanasia.pdf)

Page 20-21 of the guidelines state. 'Amphibians, fishes, and reptiles can be euthanatized by decapitation. It has been assumed that stopping blood supply to the brain by decapitation causes rapid loss of consciousness. Because the central nervous system of reptiles, fish, and amphibians is tolerant to hypoxic and hypotensive conditions, decapitation must be followed by pithing (*i.e. destroying*) the brain.'

REFERENCES

Alivereti Naikatini, Jone Niukula, Vika Raiwalui, Sarah Tawaka and Sipiriano Qeteqete 2009 *Alien Iguana Survey, Qamea Island, Cakaudrove Province, Fiji.* Unpubl.

Alivereti Naikatini, Jone Niukula, Vika Raiwalui, Sarah Tawaka and Sipiriano Qeteqete 2009 *Alien Iguana Survey, Qamea Island, Cakaudrove Province, Fiji.* Unpubl. Report, Suva.

E

A SURVEY OF THE POSSIBLE NEST BURROWS AND AWARENESS CAMPAIGNS

American iguana (Iguana iguana) Awareness Campaign in Tikina Laucala, Cakaudrove and Wainikeli

[ANNEX 5]

OCTOBER 2010

NUNIA THOMAS, SIPIRIANO QETEQETE, JERRY SURUMI

ACKNOWLEDGEMENTS

This report is a culmination of previous work conducted by NatureFiji-MareqetiViti as technical advisor to the American Iguana Eradication Campaign task force. NatureFiji-MareqetiViti thanks the following organizations and individuals for their contribution.

The American iguana Eradication Campaign Task Force, Cakaudrove Provincial Office, Jerry Surumi and his family, the youths of Naiviivi Village, Matagi Island Resort (Alice Heffernan), Qamea beach club, Laucala Island Resort, Reverend Atunaisa Suraki, the Mataveitokani Wainikeli and Korovatu, Qeleni Village, Inoke (village headman, Togo village) and Sipiriano Qeteqete (National Trust of Fiji).

The project is co-funded by the Government of the Republic of Fiji through the Ministry of Primary Industries; and the Critical Ecosystems Partnership Fund.

Technical advice was generously given by Mr. Matthew Morton and Marleen Bailing of Pacific Invasives Initiative; while technical support was provided by Dr. Peter Harlow and Dr. Robert Johnson.

SUMMARY

The American iguana eradication strategy (Harlow and Thomas 2010) outlines a community-based 3-5 years program that involves the active removal of gravid and hatchling American iguanas during their nesting period. The American iguana Eradication Campaign Task Force has to initiate the eradication campaign and maintain it keeping in mind that the scientific integrity of the eradication and community support must also maintained through-out the eradication period. These are two key aspects that have been difficult to marry in other community-based eradication projects in the Pacific.

A successful community-based eradication campaign requires a work plan that gives sound scientific data and maintains community support.

This report suggests a starting point in the American iguana eradication strategy based on field research and lessons learnt from parts of the world working on monitoring and attempting to eradicate American iguanas.

The study has identified four key monitoring sites on Qamea Island, recommends the development of a nesting area monitoring guideline following Morton (2005) and suggests a work plan for the AIEC task force and their community volunteers. This report also aims to assist the AIEC task force in making their decision on how the community volunteers will be rewarded for their participation.

1.0 INTRODUCTION

1.1 Background

Since February 2010 the American iguana Eradication Campaign Task Force has conducted field and literature research on the American iguana in Fiji (Macedru and Mataitoga 2010a; Macedru and Mataitoga 2010b; Blossom 2010; Mataitoga 2010; Harlow and Thomas 2010).

The research has resulted in the production of an American iguana eradication strategy document (Harlow and Thomas 2010). The eradication programme is projected to be community based and will involve low intensity 3 to 5 years active removal of gravid and hatchling American iguanas from nesting sites (Harlow and Thomas 2010). American iguanas are most vulnerable and visible during their nesting period (Blossom 2010; Graham and Morton 2004).

Harlow and Thomas (2010) and Blossom (2010) confirmed that August, September and October are egg-laying months for the American iguanas in Fiji. Whether the egg-laying period extends to the rest of the year is yet to be investigated.

Before the initiation of the eradication programme, several issues need to be clarified:

1. Identification of American iguana nesting sites. American iguanas lay their eggs in burrows of a sandy substrate (Rand and Dugan 1983). Differentiating between American iguana nests and land crab burrows will be the biggest challenge. Community volunteers will need to be trained on how to identify and monitor American iguana burrows.

2. Monitoring of American iguana nesting sites. This will be dependent on the proximity of the nesting site to villages/ settlements. Will the monitoring need to be scheduled? Will the community volunteers have to travel long distances to get to identified nesting areas? To maintain scientific integrity, how will we ensure that the monitoring schedule is followed?

3. Capture, reporting and killing of American iguanas. Is the capture and killing of American iguanas open to any member of the public – or should this task only be given to selected and trained individuals.

4. Community volunteers. The issue of a reward for volunteers participating in the eradication campaign has been raised several times (Macedru and Mataitoga 2010; Blossom 2010; Harlow and Thomas 2010; Thomas 2010). How will this be addressed?

The report provides feedback on the above questions and makes recommendations on how the eradication operation can begin.

2.0 Methods

The field survey was undertaken on the 28th and 29th of October 2010, and was done in three parts: Meetings (with Alice Heffernan; youths of Naiviivi village), Awareness presentations (Onodere settlement and Mataveitokani of Wainikeli and Korovatu) and field surveys and consultation with residents. Team members included Nunia Thomas (NatureFiji-MareqetiViti), Jerry Surumi (Village headman, Naiviivi Village), Inoke (Village Headman, Togo Village) and Sipiriano Qeteqete (National Trust of Fiji, Lavena Village).

2.1 Meetings

Informal meetings were held with Alice Heffernan of Matagi Island (28th October 2010), and the youths of Naiviivi Village (29th October 2010).

2.2 Awareness presentations

- Consultation and logistics planning were arranged by Waisale Mataitoga and Jerry Surumi prior to the survey dates.
- Awareness presentations were made to Onodere Settlement – residential settlement of the employees of Laucala Island Resort (28th October 2010) and the Mataveitokani (Methodist youth group) Wainikeli in Qeleni Village (29th October 2010).

2.3 Field Surveys

Intensive searches for American iguana burrows were conducted at sites from which gravid females and juveniles had been previously captured or seen (Appendix 1).

During the survey probable American iguana nests were given a reference number (H#), measured and their GPS location recorded. Photographs were taken, a general description of the surrounding area was made and local residents interviewed.

3.0 RESULTS

3.1 Meetings

The objectives of the meeting with Ms. Heffernan were to follow up on whether there had been any recent sightings of the American iguana on Matagi Island; and to address any issues that she may have. Ms. Heffernan informed the team that there had been no recent sightings of the American iguanas or their burrows. Ms Heffernan assured the team that they would contact Jerry Surumi or Inoke, and email NatureFiji-MareqetiViti of any capture or sightings of the American iguana.

An impromptu meeting with the youths of Naiviivi Village was held in Jerry Surumi's home to gather ideas from the youths on how they could become involved in the eradication campaign. The following suggestions were made by the fifteen youths present:

1. Calculate the cost of one iguana and pay individuals based on that cost
2. Donate a fibre glass boat (contribution towards the village youth project)
3. Monthly payment for an intensive group search for nests to be undertaken by the youths
4. Select a group of known hardworking, diligent individuals, and train them to undertake monitoring and reporting of iguana nests and captures, and killing of captured individuals.

3.2 Awareness presentations

I. ONODERE – RESIDENCE OF LAUCALA ISLAND RESORT STAFF

The program began at 7pm and ended at 9pm. Sixty seven employees of Laucala Island Resort were present at the presentation. The team was introduced to Emily Elliot – head of the Human Resources of the Hotel. Key questions raised:

What does one do when an American iguana is captured and the individual is told by a senior member of staff to release the animal because it is a pet? *The biosecurity promulgation prohibits any individual from keeping the iguana or its eggs. The person should be reported to the American iguana Eradication Campaign Task Force/ Police or any biosecurity officer. This applies even if it is on Hotel property.*

Can American iguanas be eaten? *Yes, they are a delicacy in South America. We do not have the recipe.*

What is the reward for capturing one iguana? *The reward system has not been decided upon; the public should be mindful that the capture and killing of the iguanas is only for their own safety and well-being. Allowing the iguanas to proliferate on their island will only be harmful to their own children and families.*

What is the incubation period of the American iguana? *This was not known at the time. Further research has revealed that the incubation period is about 8-15 weeks.*

What does the American iguana burrow/ nest look like? *We were not able to distinguish between crab holes and iguana nests at the time; but a picture was showing an obvious iguana tail trail was displayed.*

Can American iguanas bite humans, and is it dangerous? *When aggravated, yes they can.*

II. MATAVEITOKANI, WAINIKELI

The program began at 9pm and ended at 11pm. Eighty five youths, two church ministers, four church stewards and a handful of parents attended this presentation. NatureFiji-MareqetiViti was given permission by Rev. Atunaisa V. Suraki to conduct this presentation during the youths' weekend camp.

Key issues raised:

i) Can the youths lead the eradication and get in-kind contributions to their projects? For example, donating a boat – which would be beneficial to both the project and the youths. *The American iguana Eradication Campaign Task Force will have to discuss this first.*

ii) Can native iguanas be sold? *Fiji's native iguanas are protected by the Endangered and Protected Species Act (2002) which prohibits that sale of the iguanas.*

iii) What is the largest size that American iguanas can grow to? *2m.*

iv) What is the recipe for American iguanas? *Unknown at this point.*

v) How does one become involved in the project? *Individuals can volunteer through the village headman.*

3.3 Field Surveys

The weather was cloudy with heavy showers on the first day and 7 hours of good sunshine on the second day.

Six sites and twenty-two possible American iguana nests were investigated (Appendix 2). No American iguanas captured, no obvious tail marks observed; and no iguana burrows confirmed. Tail marks were difficult to ascertain – the recent heavy downpour washed and/or smudged probable tail marks (Figure 1).

Figure 1: Probable nest at Nukubalavu being measured by Sipiriano Qeteqete. No obvious tail marks or crab claw marks could be observed at all.

Interviews with the residents showed that the most recent sighting was earlier in the week (Arthur Mitchel, Yaragau Estate) – a young iguana (possibly a hatchling) sunbathing on a rock beside the pond. Residents at all the sites indicated that they would contact NatureFiji-MareqetiViti/ Jerry Surumi upon sighting of any iguanas.

The resort personnel informed the team that the iguanas cannot be killed on resort property, and so would need to be transported elsewhere.

4.0 DISCUSSION

4.1 Meetings

The nest identification and monitoring will need to be clearly outlined and dates scheduled before proposing to the communities on how it will be carried out. The results of the discussions suggest that unless this is clarified, they will not be able to decide on how the work eradication will be carried out.

4.2 Awareness presentations

The attendees of the presentations indicated an appreciation for the awareness on the American iguana project to them. Their responses indicate that while they are supportive of the initiative, they still do not know how to contribute. This will need proper planning and setting of clear milestones for participants and the task force to measure their progress by.

4.3 Field survey

Differentiating between American iguana nests and crab holes will be difficult, but it is the first and most important skill that one must have to initiate the eradication process. Morton (2005) suggests that rather than trying to just identify iguana burrows, the emphasis must be on identifying nesting beach areas and nesting burrows – i.e. measure nesting activity. This is probably also more cost-efficient as a mere iguana burrow could just be an escape burrow and not a nesting burrow, so would not contribute to the eradication of the species.

Figure 2: An old coconut estate just east of Nukubalavu - a possible nesting area. Note the burrow beside the GPS equipment in the bottom right corner.

Measuring nesting activity first requires the identification of nesting areas or nesting beaches. Based on previous sightings of American iguanas, Natiro, Niubavu, Nukubalavu and Yaragau are highly likely nesting beaches on Qamea. They all have good sun exposure, dominated by sandy substrate, are not frequented by humans and have a lot of probable iguana burrows (Figure 2).

This is consistent with preferred American iguana nesting sites in St Lucia where the criteria for identifying ideal nesting sites are: '…sandy, well-drained and exposed to the sun, but surrounded (partly or entirely) by thick vegetation cover…' (Morton 2007).

Having identified nesting areas or beaches, Morton (2005) records the following four measures of nesting activity in Saint Lucia:

- Tail drags
- Whole, empty iguana shells
- Pieces of iguana shells
- Sightings of iguanas at the nesting beaches.

These four measures allow for the identification of nesting burrows, prediction of the number of hatchlings and the prediction of nesting sites. This survey on Qamea Island has shown that it is best to survey for iguana nesting activity after and during favourable weather conditions. Searching during and after heavy rain is pointless as none of the top three measures of nesting activity could be found. Previous sightings of small and large iguanas at the five probable sites (Natiro, Niubavu, Nukubalavu, Yaragau), makes it highly likely that these are indeed nesting sites. Natiro, Niubavu, Nukubalavu and Yaragau will need to be monitored and searched for tail drags, whole empty iguana shells and pieces of iguana shells.

5.0 RECOMMENDATIONS

This survey has identified four key sites to monitor for nesting activity. The following recommendations are specifically for these four key sites; the eradication programme is not limited to these four sites and a programme including Taveuni, Vanua Levu and other islands needs to be put in place.

The meetings and awareness programmes conducted with this survey have revealed that the involvement of the community can only begin if a clear work plan is laid out, monitoring sites identified and schedules put in place. The identification of the four key sites is a good starting point for the involvement of the community on Qamea.

5.1 Monitoring nesting activity

Nesting sites in Saint Lucia require 30 monitoring days during the peak egg-laying months of February and May (Morton 2005). Harlow and Thomas (2010), Blossom (2010) and reported sightings of American iguanas around the 'ideal' nesting sites suggest that August – October are egg-laying months for the American iguanas in Fiji. The 'peak' egg laying months have not been identified, and there is a possibility that the American iguanas in Fiji lay eggs all year round. This first year of eradication will require either a monthly or bi-monthly monitoring of the identified nesting sites to confirm this.

A nesting beach monitoring guideline will need to be developed for this project. The Saint Lucia nesting beach monitoring guideline is a good example to follow.

5.2 Community participation

Natiro, Niubavu, Nukubalavu and Yaragau are all within walking distance from either Togo or Naiviivi Village (Figure 3). Two teams can be formed from Togo and Naiviivi. The team from Togo can cover Niubavu and Nukubalavu; while the Naiviivi team covers Natiro and Yaragau. Monitoring teams do not have to be too large – but the members must be able to read, fill in data sheets (this requires some training) and follow the nesting beach monitoring guideline.

Figure 3: Map of proposed beaches for nesting monitoring of American iguanas, *I. iguana* on Qamea Island (black dots).

In addition to the standard monitoring, the community should be encouraged to report any sightings of American iguanas or their eggs outside of scheduled monitoring time. This will require the identification of temporary biosecurity officers in Togo, Naiviivi, Onodere, Matagi, and the Qamea Beach Club to whom the general public can report. The resorts on Qamea and Matagi prohibit the killing of the American iguanas on their property; therefore the need for temporary biosecurity officers.

Community participation will require training of the temporary biosecurity officers and monitoring personnel (volunteers) (See Appendix 3).

5.3 Communication materials

As recommended by Macedru and Mataitoga (2010) and Harlow and Thomas (2010) the following communication materials will need to be produced:

1. Billboards at boat landings, highlighting the biosecurity promulgation. Suggested sites are:
    1. Navakacoa
    2. Bula buy
    3. Qeleni
    4. Waitabu (Naqai for yachts and cruise ships)
    5. Matei airport and Nausori Airport
    6. Weni (for Buca bay)
    7. Naiyalayala (jetty)

8. Lesuma (First Light Inn) for Kioa

9. Paradise – at junction of Delaivuna and Vuna

10. Natiro (yachts)

2. Posters highlighting the difference between American iguanas and Fijian iguanas.

3. Pocket guides on how to identify tail drags, iguana shells; and the most humane way to kill and American iguana.

All communication materials should have the contact details of relevant personnel.

6.0 REFERENCES

Blossom, T. 2010. 30 Days on Qamea Researching the Invasive American iguana *Iguana iguana*. NatureFiji-MareqetiViti, Suva.

Graham K. and M. Morton. 2004. St. Lucia Iguana Project 2004 – Report to International Iguana Foundation.

Harlow, P. and N. Thomas. 2010. American iguana Eradication Project: Herpetologists' Final Report. *NFMV report 2010/08*. NatureFiji-MareqetiViti, Suva.

Macedru, K. and W. Mataitoga. 2010a. American iguanas: a threat to Fiji's economy and biodiversity. Community Outreach Programme on the American iguana, *Iguana iguana*. June 2010. *NFMV report 2010/05a*. NatureFiji-MareqetiViti, Suva.

Macedru, K. and W. Mataitoga. 2010b. American iguana *Iguana iguana* Awareness Campaign in Tikina Laucala, Cakaudrove and Wainikeli: July 2010. *NFMV report 2010/05b*. NatureFiji-MareqetiViti, Suva.

Morton, M. N. 2005. Saint Lucia Iguana Project: Nesting Beach Monitoring Guidelines. Unpubl report to Saint Lucia Forestry Department, Durrel Wildlife Conservation Trust.

Morton, M. N. 2007. Saint Lucia Iguana Project Report 2002 – 2007. Unpubl report to Saint Lucia Forestry Department, Durrel Wildlife Conservation Trust.

Appendix 1: Calendar of American iguana activity in 2010–2011

Month	Activity	Comments
June	Gravid female from Yaragau	Dry season – ideal iguana breeding and nesting season? Gestation period ~ 65 days after mating
July		Dry season – ideal iguana breeding and nesting season?
August	Gravid female captured and dissected (55 eggs) 1 adult iguana observed on tree in Yaragau 1 adult, 3 juvenile iguanas in Yaragau	Dry season – ideal iguana breeding and nesting season?
September	Gravid female captured from Qamea Beach club and killed (34 eggs) Gravid female captured from Matagi and killed (52 eggs) Gravid female captured from Niubavu (20 eggs) Iguana tail marks observed in Yaragau	Dry season – ideal iguana breeding and nesting season?
October	1 female iguana captured in Natiro, post mortem revealed that it had already laid eggs. 1 young female captured from Qamea beach club	Wet season – ideal iguana egg hatching season? Incubation period ~ 10 – 15 weeks
November	Hatchling observed in Yaragau 1 adult observed in Yaragau	Wet season – ideal iguana egg hatching season?
December	Juvenile observed	Wet season – ideal iguana egg hatching season?
January 2011	1 juvenile captured in Naiviivi, killed	

F

AMERICAN IGUANA *IGUANA IGUANA* NESTING BEACH MONITORING TRAINING FOR VOLUNTEERS, NAIVIIVI VILLAGE, QAMEA ISLAND

[ANNEX 6]

MAY 2011

NUNIA THOMAS, KELERA MACEDRU, WAISALE MATAITOGA, REENA FIU, SIPIRIANO QETEQETE, RICK VAN VEEN, JERRY SURUMI

ACKNOWLEDGEMENTS

We acknowledge the support and endorsement of the American Iguana Eradication Campaign task force to conduct this training of volunteers.

The communication by Cakaudrove Provincial Office and their staff enabled the participation of representatives from Tikina Laucala, Wainikeli, and Tunuloa.

We are grateful to the following villages and their representatives: Navakacoa, Vatusogosogo, Naiviivi, Kocoma, Loa, Vunikura, Kanakana, Koroko, Koroivonu, Lavena, Vidawa, Qeleni, Buca, Togo, Somosomo.

The Fiji Police Force for approving the participation of their officers from Tukavesi and Waiyevo, particularly Officer In Charge (Taveuni), Rusiate Ryland.

The National Trust of Fiji and Cakaudrove Provincial office for their representation at the workshop.

Mr. Arthur Mitchell for hosting the team at Yaragau estate, thus enabling the participants to capture and experience handling an American iguana.

Vinaka vakalevu to the turaga ni koro Naiviivi (Jerry Surumi) and the villagers of Naiviivi for hosting the workshop.

SUMMARY

The American iguana (*Iguana iguana*) eradication strategy (Harlow and Thomas 2009) recommends the full participation of village volunteers. The aim of this workshop was to train village volunteers on the basic observation skills and data recording technique required for the project.

Fifty five participants attended the workshop and field training from the 23rd to the 24th of May 2011 in Naiviivi Village, Qamea Island.

More than 70% of the volunteers had yet to ever see or handle an American iguana.

Two American iguanas were captured during the workshop (one male and one female, both estimated to be 3 years old), at the Yaragau estate on Qamea island.

Key points highlighted by the participants:

- Individuals may deliberately spread the American iguana as a source of income (for the tourism industry);
- There may not be enough funding to carry our the eradication plan;
- There are individuals in villages who just do not care at all about the issue and prefer to remain ignorant;
- Boatmen and passengers are not aware that they may be agents of dispersal for the iguanas;
- Some individuals may not participate in the program out of fear of the animal;
- The possibility that the iguanas are reaching islands of their own accord should not be dismissed.

Key recommendations made:

- Appoint a leader for each of the working villages to mobilise the eradication campaign during the mating and nesting season; Leaders of each working village to undergo a 'refresher course' at the start of the mating and nesting season. The volunteers from this workshop should be nominated as temporary biosecurity officers and take the leading role and report to the task force;
- Work within already established working units in village (e.g. solesolevaki);
- Establish a database at centres accessible to village volunteers (e.g. Taveuni Agriculture Research Station or Provincial Office or Police Station);
- Consistent awareness, keep the message alive;
- Develop some simple rules of thumb for boatmen travelling between the affected islands.

Fourteen temporary biosecurity officers were identified during the workshop. These individuals are currently monitoring the nesting beaches close to their village. A refresher course will need to be undertaken with them before mobilising their work during the nesting season in August and September.

1.0 INTRODUCTION

1.1 Background

American iguanas are most visible and vulnerable during their nesting season. This is when female iguanas migrate from their inland forest habitat to coastal areas to lay their nests in sandy, well-drained soil (Morton 2005). In Fiji, American iguana sighting and euthanasia data collected from June 2009 to February 2011 suggest that the nesting season is from August to September (Blossom 2010; Surumi *pers. comm.*).

The American iguana eradication plan (Harlow and Thomas 2010) recommends that the communities in affected areas must be involved in the eradication campaign. Previous awareness campaigns to Taveuni and Qamea Island provided the team with a baseline needs assessment of the villages and identified key individuals to participate in the monitoring of nesting beaches.

The aim of the nesting beach monitoring workshop was to help volunteers wishing to participate in the project develop basic observation skills and data recording techniques for the American iguana eradication project. This workshop had to be conducted before the nesting season. More specifically, the objectives of the workshop were to:

- Learn basic observation and observer skills required to participate in the American iguana eradication project;
- Learn how to differentiate between an American iguana and a Fiji banded iguana;
- Learn how to identify an American iguana 'nesting beach';
- Learn how to differentiate between an American iguana burrow and a land crab hole;
- Learn how to differentiate between American iguana tail marks and land crab claw marks;
- Learn how to count tail drag marks;
- Learn how to kill an American iguana in an ethical manner;
- Learn how to handle an American iguana;

- Learn how to monitor an American iguana nesting beach;
- Learn how to fill in data sheets;
- Identify temporary biosecurity officers other than officers of the Biosecurity Authority of Fiji;
- Assign two volunteers per identified nesting beaches to conduct monitoring;
- Develop a data collection and reporting system and schedule.

2.0 Methods

Prior to the workshop, Tikina level meetings (Cakaudrove, Wainikeli, Vuna) were attended by NFMV personnel to inform them of the volunteers' training workshop and confirm the attendance of the village headmen and support team. The workshop was held from 23rd – 24th May, 2011 in Naiviivi Village, Qamea Island.

Divided into three parts the training covered the following:

- Participations' expectations and fears about the workshop;
- Baseline survey of the level of knowledge of the participants of the objectives of the project and the American iguana. A quiz was employed to gather this data (Appendix 1);
- Theory component on the known phenology and ecology of the American iguana in its natural range, introduction range and in Fiji. For data in Fiji, a calendar of iguana activity based on reports and sightings in the past year was used;
- Field component at Yaragau estate to show a typical American iguana nesting area; and how to differentiate between an American iguana nest and crab holes. This was facilitated by Rick Van Veen;
- Development of a problem tree and objective tree on the eradication of the American iguanas; and
- Confirmation of volunteers to trial nesting beach monitoring technique.

Facilitators included the NFMV team (Waisale Mataitoga, Rick Van Veen, Kelera Macedru, Reena Fiu and Nunia Thomas) and the National Trust of Fiji (Sipiriano Qeteqete).

3.0 RESULTS

Sixteen villages from Vanua Levu (7), Qamea (5) and Taveuni (4), the Cakaudrove provincial office and the Waiyevo Police station were represented at the workshop. Altogether there were fifty participants (Appendix 2), fourteen of whom were females.

3.1 Expectations and Fears

Many of the participants had yet to see and handle an American iguana. Consequently, their expectations were to learn to overcome their fear of the reptile as well as learn how to handle them and how they can participate in eradicating them.

The participants also voiced that they were concerned that this was yet another workshop with no follow-up action by the participants; and that there were individuals in their respective villages who did not know of the seriousness of the presence of the American iguana. These two points were also a great challenge for them.

3.2 Baseline survey

Not all questions were answered correctly by participants, indicating that there is still a general lack of knowledge amongst the general public of the ecology and behaviour of this animal; and also how the biosecurity promulgation applies to them.

3.3 Field component

The field trip to Yaragau was preceded by heavy downpour. The participants arrived on Yaragau just as the heavy downpour ceased and after a briefing, began searching for American iguanas on the property. Within 10 minutes of the search, the first iguana (a 3 year old male) was sighted at 25 m above ground, in a tree at the edge of the pond (Figure 1); and captured.

The second iguana was sighted by the participants within the next 20 minutes on another tree, 20 meters from the first iguana. This iguana (a 3 year old female) was sighted at 10m above the ground; and captured. The iguana lost its tail during its capture (Figure 2).

The euthanasia method was performed by Jerry Surumi in Naviivi village and was followed immediately by dissection.

Both iguanas were sexually mature; the female had 27 ovarian follicles (Figure 3).

At the end of the field component, the participants raised the following key points (see Appendix 4):

- They were not aware that the American iguanas were able to lose their tail like Fiji's skinks and geckos;
- American iguanas are difficult to capture. It will take a team of at least three or more people to successfully capture an iguana;
- All the holes in the ground at Yaragau estate were crab holes rather than iguana nests.

Developing a problem tree for the successful invasion of the American iguana in Fiji

The participants identified six key scenarios that could lead to the successful invasion of the American iguanas in Fiji:

- Problem 1: The American iguana is being deliberately introduced to other parts of Fiji;
- Problem 2: The American iguana is not eradicated in time;
- Problem 3: The general public does not know that the American iguana is an introduced species;
- Problem 4: American iguanas are being transported through boats without the owners' knowledge;
- Problem 5: American iguanas are hitchhiking on floating debris to other parts of Fiji;
- Problem 6: The general public is afraid of the American iguana and does not know how to catch it.

Some key points resulting from these scenarios:

- Individuals may deliberately spread the American iguana as a source of income (for the tourism industry);

- There may not be enough funding to carry out the eradication plan;
- There are individuals in villages that do not care at all about the issue and prefer to remain ignorant. The task force should consider paying some sort of reward;
- Boatmen and passengers are not aware that they may be agents of dispersal for the iguanas;
- Some individuals may not participate in the program out of fear of the animal.

Some objective notes made from these scenarios:

- Conduct the eradication campaign field component now;
- Consistently remind the general public of the issue/ keep the issue alive;
- Develop some simple rules of thumbs for boatmen and their passengers when travelling between islands;
- Continue the awareness campaigns with villages so that they may learn to overcome their fear of the iguanas.

Confirmation of volunteers to participate in the nesting beach monitoring

Fourteen representatives from all the villages present were identified to participate in the nesting beach monitoring (Table 1.0). Each was given an American iguana capture log book; and a nesting beach monitoring log book. The participants entered the parameters to record in each of the books (Table 2.0 and 3.0).

Table 1: Volunteers to participate in the nesting beach monitoring. These individuals can be assigned as the temporary biosecurity officer for their areas.

Name	Monitoring area
Joseva Sevo	Loa Village
Beni Raceva	Buca
Nemesio Naulu	Koroivonu
Kasiano Midralawa	Karoko
Inoke Koli	Togo
Apisai Tatau	Vatusogosogo
Paulo Nete	Naiviivi
Iowane Vakauru	Kanakana
Nemani Ilaitia	Kocoma
Seba Sitiano Ravugani	Lavena
Jerry Surumi	Naiviivi
Sipiriano Qeteqete	Lavena
Sirilo Leqaiwai	Vidawa
Waisale Mataitoga	Somosomo

Table 2: Captured American iguanas Log Book. Parameters to record.

Na veika me volai	Parameters to record
Na tiki ni siga	Date
Na vanua e tobo mai kina	Site of capture
Na yaca ni tamata e toboka mai na vokai	Name of person who captured the iguana
Na kena balavu (head to tail tip)	Length (head to tail tip)
Na kena balavu # 2 (head to body base)	SVL (head to body base)
Tagane/ Yalewa?	Sex (M/F)
Kevaka e yalewa:	If female:
Vakalayaloka tiko se sega?	Gravid or not gravid
Kevaka e 'io', e vica na yaloka	If gravid, number of eggs?
Kevaka e sega, e sa vakalutu yaloka oti se sega?	If not gravid, has it laid eggs in the past?
Tiki ni siga e vakamatei kina?	Date it was killed
Ocei e vakamatea?	Name of person who killed the iguana
E so tale na ka me volai?	Notes

Table 3: Nesting beach monitoring Log book. Parameters to record.

Parameters to record	Notes
Date	
Name of site at start of survey	
Weather in the last 24 hours	
Cloud cover; Sunshine	
Time at the start of the survey	
Number of iguana tail drags observed	
Name of site that iguana tail drags were observed	
Are tail drags close to a hole?	
Direction the tail drags were heading	
Number of iguana nests seen	
Total number of tail drags seen	
If eggs have been observed in the nest, number of eggs?	
If eggs shells are observed, number of eggs?	
Total number of iguanas seen	
Habitat	
Size of the iguana	
Captured or not captured	
Time at the end of the survey	

4.0 RECOMMENDATIONS

The participants were fully aware of the task given to them; and acknowledged that, as is common in such situations, there is a high likelihood that they would not all be able to perform some of the tasks. The American iguana sighting data collected so far has been from villagers and members of the general public. This method of collecting data has proven to be very informative and valuable. The data collected thus far indicates that iguana capture and nesting beach monitoring is not a year-round activity. Peak activity months are May to September each year. Bearing this in-mind, the following are recommended:

4.1 Use of volunteers from villages

This is our biggest resource and needs to be mobilised properly. Their tasks would be to concentrate on:

- Gathering data on sighted, captured and non-captured American iguanas and submitting this report to a database;
- Conducting surveys during nesting periods and mobilising response units to a confirmed nesting site;
- Conducting euthanasia on captured iguanas and recording the necessary data.

The task force may need to devise a way of rewarding the identified volunteers or employ them. Alternatively, the task force, through the Provincial office could make the egg collection or adult iguana captures a village activity during the nesting season ('solesolevaki' or 'cakacaka vaka koro'). This takes advantage of already established working units within the village administration. However the individual leading the activity must go through proper training with the task force.

4.2 Establishment of a database on Taveuni and Vanua Levu

All the data collected by volunteers need to be stored at a central location that they have easy access to. This could either be at the Provincial office, Agricultural station or the Police station.

4.3 Consistent awareness, keeping the message alive

One cannot emphasize enough the need to keep this issue alive with the current volunteers and the general public. The most common method of communication for these villages is the radio. The task force should take advantage of this method. The volunteers may need to meet at least twice in a year for a refresher course (once before the mating season; and once before the nesting season).

The use of graphic communication materials has been very helpful in the awareness campaigns.

5.0 REFERENCES

Blossom, T. 2010. 30 Days on Qamea Researching the Invasive American iguana *Iguana iguana*. NatureFiji-MareqetiViti, Suva.

Harlow, P. and N. Thomas. 2010. American iguana Eradication Project: Herpetologists' Final Report. *NFMV report 2010/08*. NatureFiji-MareqetiViti, Suva.

Morton, M. N. 2005. Saint Lucia Iguana Project: Nesting Beach Monitoring Guidelines. Unpubl. report to Saint Lucia Forestry Department, Durrel Wildlife Conservation Trust.

G

STATUS OF THE AMERICAN IGUANA (*IGUANA IGUANA*) IN FIJI

SUMMARY REPORT [ANNEX 7A]

AUGUST 2011

Overview of findings:

During the 10 weeks I spent on Qamea Island and the surrounding islands, I recorded information and assessed sightings of American iguanas from local residents. Much of this data (previously unrecorded) provided the initial basis for searching/surveying for these iguanas.

I recorded more than 180 sightings with associated GPS waypoints, 42 from local residents (these were assessed and given a reliability index-based on the evidence provided), 138 from personal observations, 112 of these observations were from 6 radio transmittered animals (Note# all my observations were on Qamea island). Sightings by island are as follows, Qamea ~160 (at least 40 different individuals-of which at least 20 have been killed, Matagi 8 (probably more than 5 individuals-1 or 2 killed), Laucala 5 (probably 5 individuals-all still at large), Taveuni 14 (probably14 individuals of which at least 3 have been killed) and Vanua Levu 1 (1 individual still alive?). Other sightings that I was unable to collect waypoints for were also noted, in many of these cases the observations appear to be of animals that have an associated waypoint, but not all.

14 American iguanas were captured 9 males and 5 females, all were from Naiviivi bay which almost certainly currently contains the highest population density. 3 males were killed and 6 were desexed and released. All 5 females were killed and autopsied. They ranged in size from 70cm (<200g) to 160cm (>4500g). The females contained close to 150 shelled and unshelled eggs.

A mating pair was observed in late May and based on other observations I believe the mating season is late May through June. The week before I left Qamea females became active and evidence suggests nesting season is early August through to late September. These periods are significant as they represent times when these iguanas are most active/visible and hence vulnerable.

They are strongly associated with coastal and riparian habitats, with more than 80% of observations/sightings within mangroves. They also favor headlands with steep cliffs that allow them to perch over water (in parts of their natural range they are known as river iguanas). Observations of iguanas in the forest were always closely associated with mangroves/headlands with steep cliffs. These habitats provide them with security as fleeing to water and swimming away is their preferred or primary method of escape from predators. Indeed all iguanas that I attempted to capture and that escaped did so by fleeing to water.

At least 6 reported sightings and 1 observation were of American iguanas swimming across substantive water bodies, suggesting swimming is also a preferred method of travel/dispersal. Several of these reports were between Qamea and Matagi/Laucala, one was possibly from Qamea to Taveuni and a portion (tail) of an American iguana was found in the belly of a large barracuda (Fish) between Qamea and Yunuca!

Recent reports (Blossom 2010, Thomas and Harlow 2010) I have read regarding the American iguana here in Fiji indicated breeding populations on Qamea and Matagi with a few observations elsewhere. I believe there is extensive breeding on Qamea and Matagi and though probably to a lesser degree, but significantly, also on Laucala and of most concern Taveuni.

Rapid surveys and awareness programs were also conducted on Kioa and Rabi islands. To date the local residents of these island have not seen any American iguanas, and we found no sign during our brief visits. However, prevailing winds and currents make these locations likely destinations for American iguanas given their preference of taking to water and hence should be surveyed periodically.

Recommendations:

- Continued awareness/training through out the affected area with a primary focus on improving reporting of sightings (i.e. immediate reporting with accurate details-particularly location, size, behavior, time).
- A central database to compile sightings and reports. This would probably be best linked to rapid response team members, i.e. biosecurity officers/students/response team members should be trained to collect and input data. The MPI research station at Mua, Taveuni seems like the logical location for the database.
- While local residents involvement will be critical. Right now it is important to build skills and experience. A small group of dedicated students need to be recruited and to work closely with an experienced field leader (Preferably with knowledge of iguanas). A number of important research questions require answers, particularly regarding dispersal and the work I was conducting should also be continued i.e. telemetry of adults/desexing of males. This would mean a number of full time people in the field, which will be essential to get the job done. In addition to research, students would be part of the response network.
- I fully endorse the proposal to import a team of dogs trained specifically for the task of finding American iguana (the sooner the better-a person can search for iguanas for days and see nothing even when iguanas are a few meters away – dogs would greatly improve the search effort). The use of firearms used in conjunction with dog teams should also be considered; catching iguanas can take many hours, where a team of dogs and a .22 rifle would be far quicker and more effective. Moreover, capturing iguanas along cliff sites/high tree canopies, is time consuming and dangerous.
- Information gathering on Taveuni is probably the greatest immediate priority. Establishment of a large population of American iguanas on Taveuni will likely result in a problem that is financially insurmountable. Regular/weekly communications with community leaders should be considered to keep the issue relevant and to ensure rapid reporting. An ideal person for this task would be Sipirano Qeteqete NHT Lavena, i.e. a small phone credit allowance and a list of key communities leaders.
- The project will need some equipment, including several GPS's, 2 or more sea kayaks (approaching mangroves at low tides is probably the best way to locate iguanas), 8m+ noose poles (2 or 3 per response team).

Conclusions:

At this point it is impossible to give an accurate estimate of the numbers of American iguanas living in Fiji, but an educated guess would probably be about 2500 living on Qamea, Matagi, Laucala and Taveuni, perhaps 400 adults and the remainder juveniles and hatchlings. We have no idea of rates of mortality, but compared to their native range, Fiji has very few predators and they are highly fecund animals.

Eradication of these animals will not be easy, they have been introduced in more than 30 other locations and to date no introduced populations have been eradicated. However, a serious sustained effort to eliminate these animals has never been attempted. The Fijian population of American iguanas is definitely increasing in number and quite rapidly expanding its distribution and immediate actions are required if this is to be curtailed.

At this point containment is a priority with a focus on controlling those that are now on Taveuni. Improved reporting and immediate response to reported sightings is also necessary as is the development of a dedicated team with the necessary skills. If dogs and firearms can be obtained then the sooner the better, the American iguana population is still relatively small but if it remains unchecked it will likely grow exponentially.

Photo: NFMV/Rick van Veen

Female American iguana fitted with a transmitter shows how well they are camouflaged.

Radio transmitter sewn into the nuchal crest of a large female America Iguana.

ANNEX 7

AUGUST 2011

NatureFiji MareqetiViti

BIOSECURITY AUTHORITY FIJI

Status Report: The American iguana *Iguana iguana* in Fiji- May-August 2011.

Report Prepared for NatureFiji-MareqetiViti and the American Iguana Eradication Task Force By:

Rick Van Veen

Cover & Text Pictures: NFMV/Rick van Veen

NFMV Report Number:.....2010/11
Dated: 30th August 2011

14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

Eradication of the introduced American iguana (*Iguana iguana*) from Fiji will be a difficult task and may take 5 years or longer. If eradication is to be successful, it will require immediate and sustained action. They are highly fecund animals and in Fiji have very few predators. The population is growing fast and they are spreading quite rapidly.

Continued awareness and the acquisition and training of a skilled team will be critical. The importance of quick and accurate reporting of sightings will also be central to a successful outcome. Currently, data collection is poorly coordinated and needs to be centralized (probably MPI facility at Mua, Taveuni) and linked to a more effective system regarding the response to sightings. I suggest a small team of dedicated people-perhaps consisting of an experienced field leader and preferably several interested university students. The students would attempt to fill some of our knowledge gaps regarding American iguana ecology, respond to sightings/reports and keep the issue topical by having a full-time presence.

The Island of Taveuni is a priority and immediate effort is needed to identify and control American iguanas on this island. Sightings on Taveuni are still few, but they are widely distributed. If they become well established on Taveuni it's very likely they will reach Vanua Levu and the cost and effort required for such a large problem will probably become financially insurmountable.

Photo 1. Female American iguana fitted with a transmitter shows how well they are camouflaged.

2. INTRODUCTION

In 2000, a small number (7-12) of American iguanas (*Iguana iguana*) were apparently smuggled into Fiji and released into the North Western portion of Qamea Island, Cakadrove province, Fiji (Naikatini *et. al.* 2009). This illegal introduction has resulted in the establishment of a small but rapidly growing population that is expanding its distribution. There are breeding populations on both Qamea and Matagi Islands (Harlow & Thomas 2010) and established populations of breeding animals are also likely on Laucala and Taveuni. Additionally sightings or captures of American iguanas have also been recorded from Koro, Wakaya and Vanua Levu.

The American iguana has been introduced in more than 30 different locations outside of its natural distribution; to date there have been no successful eradications (Krass 2009). Though not considered a major agricultural pest, several reports make reference to its destructive effects on landscape and agricultural plant species (Kern 2004, Townsend *et. al.* 2003). In Florida, it is a public nuisance and health risk, particularly to the food and hotel industries, where they are known to scare and steal food from guest/customers and defecate on tables and chairs (Green Iguana Society 2009). Relevant to this issue is their implication in the transmission of the zoonotic bacteria- Salmonella (Anonymous 2009), to people who handle them or perhaps come into contact with their faecal matter. Also possible is the transmission of other diseases to, and competition with, native species such as Fiji's endemic iguanas, fruit pigeons and parrots.

In Fiji, we know American iguanas have very few predators and that they eat many of the same plant species Fijian people rely on for food and income. The impact of a large population of American iguanas on the environment, agriculture, and people's livelihoods is presently unknown. However, they are known to reach very high densities, sometimes exceeding 100 kg/ha, "this is greater than the average biomass concentration of grazing ungulates in the spectacular herds of East Africa" (Rodda 2003) and therefore would be expected to negatively impact Fiji's natural and agricultural ecology.

This report aims to address some of the baseline data requirements set out in the Herpetologists final report: American iguana eradication plan 2010 (Harlow & Thomas 2010). Reports/Sightings have been compiled, evaluated and mapped, along with additional observations obtained during the course of my fieldwork. Methods of capture and population control were examined and evaluated.

A total of 214 reliable observations were recorded with GPS waypoints from Qamea, Matagi, Laucala, Taveuni and Vanua Levu. The majority of observations 195 were from Qamea, most of which were obtained from 6 American Iguanas fitted with radio telemetry units (120 waypoints). These provided important ecological data, however, the short period of study is unlikely to reflect actual home ranges size or annual spatial/habitat use.

A total of 20 separate individuals (not sightings) were recorded by the reporting investigator, 14 of these were caught, 9 Males and 5 Females. Six of the males were de-sexed (5 used in the telemetry study) and released; the remainder were euthanized. All of the captured females (1 female was used for telemetry work and recaptured before I left) were euthanized for autopsy and found to contain a total of 156 shelled and unshelled eggs.

3. METHODS:

3.1 Awareness program, recording sightings

My arrival on Qamea Island coincided with MaraqetiViti's awareness/nesting survey and American iguana response training workshop in Naiviivi village. Representatives from most of the villages and settlements currently affected by the invasive American iguana (*Iguana iguana*) and areas where American iguanas are likely to spread were present. Through this network, I made contact and began interviews with people who see or have seen American iguanas and obtained names of others (and where they reside) who also had useful information.

In many cases, reported sightings lacked important details and were excluded from the results. Recorded sightings were assessed based on the following information, location, date, time of day, weather conditions, behaviour, frequency of sightings, number of observers, previous reports in the same area, previous information given by the respondent and personal observations. Additionally, a scale of reliability, based on the respondent's evidence has been included with sighting records (Appendix1).

3.2 Locating and capturing American iguanas

During the two weeks following the initial awareness/training workshop, general reconnaissance trips both overland and sea based were conducted, in conjunction with resident interviews. Information gathered during this period provided an overview of the distribution, abundance and behaviour of the American iguana (*Iguana iguana*), particularly in the Naiviivi bay area. This established a network of reliable informants, many of whom, reported sightings during my stay, several of which led to iguana capture's.

American iguanas were captured by day, and capture methods included the following:

- Climb, flush and hand capture- requiring 2 or more people, one individual climbs and flushes iguana/s from perch tree, then people on the ground attempt to catch it by hand.
- Noosing- an 8m telescopic fiberglass noosing pole with a 50kg wire trace noose is extended to the iguanas perch location, the noose placed over its head and raised to secure the animal, this is attempted either from the ground or from within perch trees.
- Live box traps (Tomahawk-model-206)-these are placed in locations iguanas are known to travel i.e. feeding or basking sites, and baited with fruit (banana or paw paw).
- Wire snares - set in regularly visited forage trees.

3.3 Telemetry and Phallectomy (Desexing of males)

All telemetry was conducted within the Naiviivi bay area, due to travel constraints and time limits. Captured animals were assessed with regard to their use for telemetry i.e. reproductive and uninjured. Apart from males that were euthanized for response team capture/euthanasia training (1 individual), injury (1 individual) or age (1 individual) all other males (6 individuals) were given surgical phallectomies (for methods see Mader 2009, Rivera et. al. 2011) and released with radio telemetry units (5 individuals) or given a tattoo and wire trace looped through the dulap (1 individual) for future identification.

A total of 6 American iguanas were fitted with radio transmitters, 5 males and 1 female. Home range, habitat use and other ecological data were collected for a maximum of 55 days. Radio transmitters were sewn into the nuchal crest with 25kg fishing trace wire with pieces of bicycle tire tube as a backing plate, a similar method has been used successfully with Jamaican iguanas.

Photo 2. Radio transmitter sewn into the nuchal crest of a large female America Iguana.

Additionally, a captive male Iguana housed at the Department of Agriculture's Koronivia facility was also surgically de-sexed. The individual at Koronivia is a display animal and was de-sexed to remove the potential of having a reproductive population on VitiLevu.

3.4 Additional Awareness/Surveys/Searching

Awareness meetings interviews and searches for American iguanas or sign of them were also conducted in villages and along the coast of the Natewa peninsula, Vanua Levu and the islands of Rabi and Kioa. During this period of about 8 days, myself and representatives from MaraqetiViti presented information and spoke with ~2000 residents within this region.

4. RESULTS

4.1 Recorded sightings

A total of 214 sightings were recorded, all within coastal areas (<100m). The majority, both observed and reported were within mangrove habitats, followed by coastal headlands, then beach habitats both disturbed and undisturbed.

Figure 1.Qamea, Matagi and Laucala Islands American Iguana survey areas and sightings. Red points represent actual locations and green points represent approximate sighting locations. Yellow lines represent areas surveyed.

Most sightings and reported sightings are from Qamea (80%) with approximately 90% of these from the Naiviivi bay area, excluding radio telemetry data.

Six sightings were reported from Matagi and 5 from Laucala, though there were other reports from both these islands, they either lacked detail or I was unable to follow up on the information given. As was the case onLaucala Island where security and guest privacy issues made data collection difficult. However, reports from a number of employees indicate several resident iguanas at the golf course and others reported seeing American Iguanas in the northern portion of this Island. On Matagi Island, I found evidence of several regularly visited and wide spread feeding sites that likely represent more than the 6 individuals reported.

Before I reached Taveuni Island I was told there were 2-3 reports of American iguanas from this Island, there are now 11 sightings (with recorded waypoints), and a further 2-3 that still need to be followed up.

Figure2. Map showing area surveyed for American iguanas and recorded sighting locations. Red points represent reported or observed sighting locations, green points represent approximate sighting locations and yellow lines represent areas surveyed.

4.2 Captures, telemetry, kills and autopsies

A total of 14 American iguanas were captured (Appendix 2) during the period May 25 through to 2 August 2011. Three smaller males were killed and 6 were de-sexed and released (5 with radio transmitters). Five females were killed and autopsied and reproductive status recorded (see table 1).

Table 1. Post-mortem and reproductive status of captured American Iguanas 2010/2011.

A total of 120 waypoints were recorded from 6 radio-telemetered individuals, 5 males and 1 female. The 5 de-sexed telemetered males were all caught between Yaroi and Saravi and all remained in or on the edge of the mangroves until 1st August, at which point 3 of the 5 telemetered males moved to inaccessible locations within relatively intact forest.

4.3 Habitat use and movement

The majority of American iguana observations were from mangrove/riparian habitats (74%), followed by coastal headlands (14%) then beach and littoral habitats (12%).

The 5 telemetered males, followed for up to 55 days, and 2 other males that were observed 3-5 times over the same period all remained within mangroves or along their fringes and moved relatively short distances (<150m). The highest density of American iguanas was close to Yaroi in mangrove habitats, adjacent steep forested slopes where 11 of the 20 individuals that I saw were seen. 73% (n=148 obs.) of my observations were of American iguanas perched over water, if a female that perched over a periodically dry perennial creek is included than perched over water observations total 88%.

Although fleeing to water was the primary escape response (i.e. all escape attempts noted), between 5-7 reported sightings were of individuals crossing extensive bodies of water. Therefore, over water dispersal, potentially across several km's of water maybe an important factor in the spread of these iguanas (see photo 3).

Photo3. Track of an American Iguana which walked along the beach crest, down across the beach flat at low tide and swam out to sea, possibly headed to Yaragau from Naiviivi.

Photo4. This photo shows a pair of mating American Iguanas in late May 2011. They were perched high in a tree/vine matt over the sea, the female was captured, but the male escaped, diving >20m into the sea.

4.4 Reproduction- mating, nesting and hatching

Between the 28 May-18 June four female iguanas were observed in close proximity (<2m) to adjacent males and one pair were observed mating-28 May 2011 (see Photo 4.). Beyond the 18th June no females were observed, aside from a telemetered female, for almost 7 weeks; in addition all reports I received during this period appear to be from male iguanas.

The telemetered female following release, moved ~300m from it's capture location to the bank of a small forested perennial creek. She remained here, 8m up a 12m tree on a vine matt for 52 days. During this period she moved <5m, before moving back to where she was originally caught (within 10m). She was then recaptured, the transmitter recovered and killed for autopsy. She contained 42 shelled oviductal eggs and appears to have been moving to her nesting site-likely Yaragau. The same day another gravid female containing 26 shelled oviductal eggs was caught at Yaragau.

In the same week the telemetered female was captured, 4 other gravid females were seen, 3 of these were caught killed and autopsied, the total yield was 156 shelled and unshelled eggs from the 5 females.

Figure 3. American Iguana nesting areas. Red areas represent locations where gravid females with shelled eggs have been caught, groups of hatchling seen or actual nests located or a combination of these findings. Green areas are sites with ideal nesting habitat and where resident adult iguanas are known.

4.5 Food plants

At least 12 plant species were identified as food items of the American iguana (Table 2). Once again, aside from personal observations, reports of feeding were assessed based on the information given i.e. seen eating the plant, rather than simply being on the plant, time of day, part of the plant eaten.

Colocasia esculenta (Dalo) was frequently reported as a food plant of the American Iguana, and it seems likely that the young leaves would be eaten, however, no one could recall incidents where American Iguanas were actually seen eating this plant species nor did I see any evidence. There were also reports of American Iguanas eating *Bruguierra exorrhiza* (Dogo), however I could find no evidence to support this claim.

From my observations, plant species most frequently eaten were *Pongamia glabra*, *Erythrina variegata*, *Morinda citrifolia* and *Merremia peltata*. All of which were close to or within mangrove habitats, with the exception of several *Pongamia* and *Erythrina* on Matagi Island that were within the Island's interior. Furthermore, most of the remaining reports of American Iguanas feeding on cultivated plants in farms/gardens, corresponded to areas that were adjacent mangrove/riparian habitats.

Table 2. Food plants eaten by American Iguanas in Fiji.

Plant species	Fijian name	observed by
Morinda citrifolia	Kura	RVV others
Pongamia glabra	Vesivesi	RVV others
Erythrina varigata	Drala	RVV others
Merremia peltata	Wabula	RVV others
Ipomoea batatas	Kumala	RVV others
Abelmoschus manihot	Bele	Arthur Mitchell his wife and others from Saravi and Naurauda
bananas	Vudi	George Williams
pawpaw	Weleti	RVV others
coconut flowers?	Niu	RVV
unknown vine	?	RVV
unknown tree	?	RVV and LiloSurumi
Bruguerra exorrhiza	Dogo	Bejju (Yaroi caretaker) and others
Colocasia esculenta	Dalo	Reports but no evidence
Mangifera indica	Mago	Jerry Surumi and Pita Bua
Terminalia catappa	Tavola	Arthur Mitchell, Lilo, and others i.e. Jone from Saravi
Hibiscus sp	?	Tracy Percell and Alice Heffernan and Pita Bua

Photo 5. (Left) *Pongamia glabra* (Vesivesi) with repeatedly browsed shoots. This was a live fallen tree within the mangroves. Photo 6. (Right) *Morinda citrifolia* (Kura) leaf with a bite mark from an American Iguana clearly visible.

5. DISCUSSION

5.1 Source population

Reports by people from the village of Naiviivi and settlements of Lovoni, Vatusogosogo,Waibulu suggest a small number of American iguanas (7-10 individuals hatchlings) were releasedat Yaroi, (Qamea) between 1998-2000. Joseph Kolinibaravi the caretaker at Yaroi at the time, was present when property owner, Mr Ken Honnings released 7-10 hatchling American iguanas (Iguana iguana), apparently for the purpose of managing insect pests?

5.2 Location and establishment

Since their apparent introduction in 2000 (other reports suggest some may have been introduced in 1998) at Yaroi, since then they have established breeding populations on multiple islands and are increasing their range. The first individual in Naiviivi village was reported in 2002 and possibly represents a female searching for a suitable nesting site it appears to have been an adult. If some individuals were introduced at an earlier date then, reproductive females may well have been in the population as early as 2002.

5.3 Distribution and dispersal

By 2006 American iguanas were reported at Lali in the north of Qamea, along with a tentative report from Taveuni. The first photograph was circulated in 2008 from Matagi Island and by this time sightings were also being reported from Laucala. Now in 2011 reports from Qamea, Matagi and Laucala are common, and becoming more so on Taveuni. This year they have also been detected as far afield as the Islands of Wakaya, Koro and Vanua Levu.

Although some of this iguana dispersal is almost certainly through transport by people i.e. Wakaya, Koro. I suspect that American iguanas are swimming further afield than previously thought. Based on reports, personal observations and the broad distribution of sightings from Taveuni, I believe some of the reported sightings from Taveuni are of animals that reached the island by swimming there. The report by the Turaga ni koro of Togo village on Qamea, who found the tail of an American iguana in the stomach of a large barracuda between Qamea and Yanuca suggests it may be possible that they are capable of travelling even further afield. At this point further research on adult movements and particularly hatchling dispersal is required.

The area between the southerly headland of Nukubalavu and the settlement Nauradua, lie either side of Yaroi and appear to have the highest densities, followed by the southern portion of Naiviivi bay from Vatusogosogo settlement to Naiviivi village. Outside of these areas they appear to be very thinly dispersed though further investigation is required.

Hatchling American iguanas disperse immediately after hatching and are known to travel distances of over 1 km, and it's generally thought that they disperse along coastal areas and waterways (Rodda 2003), but the data are few and on small islands such as Qamea or Matagi dispersal overland to coastal areas is probable. A short telemetry study of hatchling dispersal would likely resolve this question and be a useful start to estimating rates of mortality.

5.4 Habitat selection

In parts of their native range, American Iguanas are known as river iguanas, where they are generally associated with coastal wetlands, riverine and riparian habitats. Thus far, Fiji is no exception by far the greatest number of sightings and reports were from iguanas seen in mangrove habitats.

The cliffs and steep slopes of coastal headlands are also favoured habitats of these iguanas, providing excellent protection and are often associated with beach/littoral habitats where primary nesting habitat is most available.

5.5 Food plants

Although only 15 or fewer plant species were identified as food items of the American iguana, the period of investigation was not particularly revealing for collection of this data. Both females and males eat very little, if at all during the reproductive period. The results of this work suggest May/June is mating season, June through August-egg development and August/September-egg deposition. However, reports and observations suggest several species are particularly important these include drala, vesivesi, *Merremia* and kura (see Table. 2). Though reports of damage to cultivated garden plants are relatively few, the Iguana population is still very small and impacts on agricultural species may not be apparent till the population reaches higher densities. Of the food plants farmed and eaten by people, bele (leaves), sweet potato (leaves) and pawpaw (fruit) were most frequently eaten.

5.6 Population estimate

Without demographic mortality rates it is impossible to accurately estimate the size of the American iguana population. However, American iguana mortality in Fiji is almost certainly far lower than within their natural range, given the lack of predators in Fiji. It is therefore likely the population is growing at close to a maximal rate.

As an educated guess, based on my observations and the reports of others I believe there are probably 2500 or more American iguanas living on the Islands of Qamea, Matagi, Laucala and Taveuni, perhaps 400 adults and the remainder juveniles and hatchlings. Also likely, are breeding populations on all four of these Islands. With larger numbers of reproductive individuals entering the population each year it is expected that without heavy intervention in the next two years, American Iguanas will reach numbers in the 10's of thousands and will rapidly expand their current distribution.

5.7 Control and eradication

From the small amount of data we have, it appears males, particularly males defending mating territories, are most vulnerable during mating season (May-June). During this period they are more conspicuous in their colouring and behaviour i.e. fighting with other males, patrolling their selected territories and often perched at high and exposed vantage points.

Females on the other hand, essentially disappear after they have been mated. Moving to a secure location for approximately 8 weeks to allow their eggs to develop. Following this period they become vulnerable when they travel to and or search for nest sites, early August possibly through to the end of September. Nesting would be likely be a very effective period to use search dog teams. Males during mating season look suitably vulnerable to a .22 rifle; shots can be fired from the reef flat allowing safe shooting.

6. RECOMMENDATIONS

6.1 Awareness/Training

Awareness and community involvement is critical. The current awareness program conducted by MaraqetiViti has been effective and should continue, perhaps with shorter but repeated visits (particularly during key periods such as nesting/hatching), emphasizing immediate reporting and collation of data to a central database.

6.2 Response teams/Data collection

This is most critical on Taveuni Island, reports of sightings indicate a sparse population but they are very wide spread and, with adults identified among the sightings, it's likely a small breeding population is present on the island. More information on the status of these Iguanas is required. Taveuni Island, an immediate priority. Perhaps the best option here would be to have Sipirano Qeteqete (National Trust for Fiji, Lavena) begin data collection immediately.

Several research questions should be investigated as post-graduate research projects.

Are hatchlings dispersing overland? How far do they disperse and are they dispersing across significant bodies of water? Similarly, movement of females and the location of their nest sites will require further and consistent investigation. Nest site activity may be the most reliable index of population size and growth.

The students would also play a key role in sighting response/captures (euthanasia), collation and entry of data and most importantly, keeping a fulltime presence.

6.3 Search/Capture methods

Between late May and late August capture and location results were best between 09:00-11:00M in the morning and 14:30-17:00pm. Some areas can only be searched overland, however, iguanas are more clearly and more frequently seen from water.

By far the most effective method of capture and locating animals, is at low tide searching the mangroves/coastal vegetation from the sea, locating, confirming with binoculars, then climbing through the mangroves, and attempting to noose the iguana with a noosing pole. With this said, aside from the capture of specific individuals (e.g. large males for de-sexing), shooting of others (following the recommendation of Harlow & Thomas 2010) will probably be the most effective method to reduce numbers.

However, in terms of eradication, teams of well-trained dogs in conjunction with firearms will probably be the most effective method.Many American iguana perch sites are in difficult to access areas and capture in these locations can take several hours for single individual and in many cases they will flee to water and be more wary in the future.

6.4 Equipment

Two sea kayaks -Kayaks give the best access and are inexpensive transport.

A 0.22 rifle set up for this sort of work, would greatly increase capture/kill rates. Increasing survey range, speed and effect.

A good set of habitat maps and small portable field camp.

7. Conclusions

At this point it is impossible to give an accurate estimate of the numbers of American iguanas living in Fiji, but an educated guess would probably be about 2500 living on Qamea, Matagi, Laucala and Taveuni, perhaps 400 adults and the remainder juveniles and hatchlings. We have no idea of rates of mortality, but compared to their native range, Fiji has very few predators and they are highly fecund animals.

Eradication of these animals will not be easy, they have been introduced in more than 30 other locations and to date no introduced populations have been eradicated. However, a sustained effort to eliminate these animals has never been attempted and though introduction to Fiji is recent and their distribution quite small. Unfortunately, the Fijian population of American iguanas is definitely increasing in number and quite rapidly expanding its distribution and will therefore require immediate action if this is to be curtailed.

At this point containment is a priority with a focus on controlling those that are now on Taveuni. Improved reporting and immediate response to reported sightings is also necessary as is the development of a dedicated team with the necessary skills. If dogs and firearms can be obtained then the sooner the better, the American iguana population is still relatively small but if it remains unchecked it will likely grow exponentially.

8. ACKNOWLEDGMENTS

I would like to thank the following people for assisting me with this work. Firstly, the staff at MaraqetiViti in particular Mr Waisale Maitatoga (MaraqetiViti and Cakaudrove Provincial Council) of Somosomo, Ms Nunia Thomas, Ms Kelera Macedru and Ms Reena Fiu who provided endless support, introduced me to community leaders in the American iguana affected area and made my induction to Fiji very enjoyable. The Turaga ni Koro of Naivivi village, Mr Jerry Surumi and his family, who assisted in every aspect of my work, made me feel like a member of their family and who have been instrumental in identifying the presence of American Iguanas in Fiji. I also acknowledge Ratu Ro Aca Matatini and the Cakaudrove Provincial Council and thank everyone who provided information andtheir personal experiences with the American Iguana. Lastly, I would like to thank the Permanent Secretary, Mr. Mason Smith (Dept. of Agriculture) and the Director of Biosecurity, Mr. Elvis Silvestrini who helped streamline bureaucratic process and generated broad awareness to the seriousness of the problem.

9. REFERENCES

Anonymous 2009. "Ongoing investigation into reptile associated salmonella infections" Health Protection Report 3 (14). 9 April 2009. Retrieved 12 April 2009

Harlow,P.S. and Thomas, N. October 2010. American Iguana Eradication Project:Herpetologists' Final Report. Unpublished report to the American Iguana Eradication Campaign Task Force, Fiji and NatureFiji-MareqetiViti. Pp 16.

Green Iguana Society 2009 http://www.greenigsociety.org/feraligs.htm (accessed Aug 29, 2011)

Kern, W. H, 2004. Dealing with Iguanas in the South Florida landscape. Fact sheet ENY-714, Institute of Food and Agricultural Sciences, University of Florida.

Kraus, F, 2009. Alien Reptiles and Amphibians. A Scientific Compendium and Analysis. Springer.

Mader D., 2009. Methods for altering reproductive status in green iguanas (Iguana iguana).2009 Proceedings Association of Reptilian and Amphibian Veterinarians. Pp. 61-62

Naikatini, A,Niukula, J,Raiwalui, V, Tawaka, S, and Qeteqete, S. 2009.Alien Iguana Survey, Qamea Island, Cakaudrove Province, Fiji.Unpubl. Report, Suva. Pp.21.

Rivera S., Divers S.J., Knafo S.E., Martinez P., Cayot L.J., Tapia-Aguilera W. and Flanagan J. 2011.Sterilization of hybrid Galapagos tortoises (Geochelonenigra) for island restoration. Part 2: phallectomy of males under intrathecal anaesthesia with lidocaine. Veterinary Record Vol.168 issue 3. Pp. 78

Rodda, G.H. 2003. Biology and reproduction of Iguana iguana in the wild. In: E.R. Jacobson (ed.). Biology, husbandry, and medicine of the green iguana.

Townsend, J. H, Krysko, K. L. and Enge, K. M. 2003. Introduced Iguanas in Southern Florida: A history of more than 35 years. IGUANA, Vol. 10, Number 4. Pp 111-118.

Woodward, D.L., Khakhria, R. and Johnson, W.M.1997. Human salmonellosis associated with exotic pets, Journal of Clinical Microbiology 11(35): 2786-2790.

APPENDIX 1:

REPORTED SIGHTINGS AND OBSERVATIONS.

Island	Date	Time	Location	Location	Location	habitat	micro-habitat	Sex/age class	Behaviour	Reported by	Evidence	Evaluation 1-4	Notes
Qamea	Jan-10	?	Naiviivi village	S16.76921	W179.78682	beach crest	Drala tree	Hatchling	feeding/baskir	Lilo Surumi	others saw it t	1	Several others found close by around the same time.
Qamea	Jan/Feb 2010	?	Naiviivi village	S16.76922	W179.78639	Disturbed Fore	Coconut palm	? Adult	Climbing?	Pela ?	Caught and kil	1	Next to the last house in Naiviivi <5m from the creek.
Qamea	Jan/Feb 2010	morning	Natiro landing	S16.76835	W179.78566	Disturbed fore	Beach-concret	M Adult	Came out of s	Lilo Surumi	Good descripti	2	Fled back to the sea when attempting to catch. Another report of a smaller iguana basking on the same slab-no date?
Qamea	Jan/Feb 2011	various	Lovoni	S16.76740	W179.78328	Introduced ga	Hibiscus hedg	3 Adults-M,F,F	Feeding/baskii	Pita/Ana Tabu	Photos and mi	1	Possible that at least a few of these were brought here, some years back-Pita likes them-also reports feeding on grass clippings. Seen periodically but regularly.
Qamea	Aug/Sept 201	Morning	Vatusogosogo	S16.76732	W179.77905	Vegatable gar	garden	1 F Adult	Nesting	Apisia (Taraga	Killed by Jerry	1	<10m from the creek, another individual seen close to here July 2011
Qamea	Jan/Feb 2011	Afternoon	Close to Naura	S16.95835	W179.77582	Riparian/Mang	Merremia pelt	Male Adult	Basking/Feedi	Apisia (Taraga	Apisia's brothe	1	Close to George Williams brothers house.
Qamea	May 2011.	Morning/Aftern	Nauradua	S16.75951	W179.77750	Riparian/Mang	Mangroves, vii	5 Male/Female	Basking/Feedi	George Willian	Apisia and oth	1	Tall mangroves here bordered by forested slopes.
Qamea	Jan/Feb 2011	Afternoon	Saravi	S16.76161	W179.78001	Riparian/Mang	Merremia pelt	Male Adult	Basking	Apisia (Taraga	Apisia gave to	1	At least 3 have been killed close to this location-over the past 3 years
Qamea	28-May-11	13:07	Saravi	S16.76166	W179.78030	Mangroves	Red mangrove	Male Adult	Basking	RVV	RVV-photo	1	Over a 2 month period I saw this animal 4 times-twice it escaped capture.
Qamea	Jan/Feb 2011	Late morning	Saravi	S16.76161	W179.78072	Riparian/Mang	Vesi vesi	? Med Adult	Feeding	Apisia (Taraga	Others have re	1	This vesi vesi tree is over water on the edge of mangroves
Qamea	28-May-11	13:52	Yaragau-east	S16.76352	W179.78905	Forested Head	? Vinematt coi	F Adult, M Ad	Mating	RVV	Lilo, Apisia	1	This pair were seen in the same location several weeks later-female was caught and transmittered.
Qamea	?	?	Slopes behind	S16.77498	W179.78432	Garden/forest	?	?	?	Jerry Surumi	several others	4	Information seems a bit scetchy
Qamea	?	?	Slopes behind	S16.77345	W178.313	Garden/forest	?	?	?	Jerry Surumi	several others	4	Information seems a bit scetchy
Qamea	May/June 201	Morning	Lovoni creek	S16.76720	W179.78308	Riparian/Mang	On the ground	M, F pair?	Mating?	Jerry Surumi	Good descripti	2	Around mating season and male and female iguanas have been observed regularly close to this site.
Qamea	29-May-11	Morning	Natiro-behind	S16.76837	W179.78554	Disturbed Fore	Morinda citrifo	? Juvenile	Feeding	Small group o	Other sighting	2	Evidance to feeding on the mention tree, and other trees close by (Kura and vesi vesi).
Qamea	Jan-11	Morning/Aftern	Naiviivi village	S16.76981	W179.78804	Disturbed Fore	Drala tree, pai	? Hatchlings	feeding/baskir	Lilo, many oth	Several were c	1	Heard reports of these individuals many times.
Qamea	?2006	?	Lali	S16.74712	W179.76436	Settlement	?	Adult	?	Alice Heffernai	Photo	2	Didn't see the photo but apparently there is one and it was reported to the authorities?
Qamea	16-Jul-11	Morning	Ndilo	S16.79134	W179.77711	Mangroves	Red mangrove	M Adult	Basking/fled t	Siko Surumi	Several wome	3	Not much detail and I didn't speak to the people that saw it-i.e. second hand information-However, its seems credible based on the description I got.
Qamea	2008-2010	?	Niubalavu	S16.75031	W179.75574	Coconut plant	Ground, cocor	Adults, Juveni	?	Sam Mitchell/	Many others d	1	Several have been collected from this site, some have been transferred to Taveuni from this site. Almost certainly a nesting area. Although not seen here for 2 years by Sam other have seen them here.
Qamea	1-May-11	Morning	Nukubalavu	S16.75299	W179.79095	Garden	pawpaw	Adult	Feeding	Philippe (caret	Good descripti	2	Sees iguanas here semi regularly
Qamea	1-Jun-11	16:10	Headland btw	S16.75578	W179.79882	Cliff face	bare rock	M Adult	Basking	RVV?Jerry Sur	Photos	1	Sea to rough to attempt capture.
Qamea	28-May-10	8:00	Lovoni creek	S16.76694	W179.78219	Riparian/Mang	Coconut palm	? Med Adult	Basking	Sony (Jerry Su	Seen by many	1	I caught this individual some weeks later-spear injury in the leg.
Qamea	? 2009	?	? Beach north	S16.79685	W179.79024	Littoral/beach	Beneath Drala	Adult	Dead	Jerry Surumi	Bones went to	1	Searched here a number of times and found no other evidence of iguanas?
Qamea	? 2010	?	Namata	S16.74648	W179.77019	Littoral/beach	Ground	Male Adult	Walking	Tomas Mitchel	? Taraga ni ko	2	Good description-Tomas has also seen-hundreds of hatchlings at Yaragau (his brothers place) amoug the water plants on the small pond.
Qamea	2010	Afternoon	Niubalavu	S16.75044	W179.75584	Coconut plant	Ground	Hatchling	Basking	Tomas Mitchel	Just his word	4-Jan	The individual was brought by picinicers back to Taveuni?
Qamea	8-Jun-11	11:00	Btw Saravi an	S16.76303	W179.78342	Mangroves	Red mangrove	M Adult	Basking	RVV	I saw it, it fled	1	I believe I caught this individual at a later date.
Qamea	Mar-11	morning	Btw Saravi an	S16.76303	W179.78342	Mangroves	Red mangrove	M Adult	Basking	Jone (Saravi)	Loads of feedi	1	Seen regularly at this site-I caught 4 saw another 2 and heard reports of at least one other I didn't see?
Qamea	25-May-11	11:30	Yaragau	S16.76185	W179.79070	Garden	fruit tree?	F Adult	Perch/inactive	RVV/many oth	Caught and kil	1	Caught at the awareness workshop, heavy rain.
Qamea	25-May-11	11:30	Yaragau	S16.76185	W179.79037	Garden	fruit tree?	F Adult	Perch/inactive	RVV/many oth	Caught and kil	1	Caught at the awareness workshop, heavy rain.
Qamea	28-May-11	13:52	Yaragau-east	S16.76354	W179.78911	Forested Head	? Vinematt coi	F Adult, M Ad	Mating	RVV	Caught female	1	This pair were seen in the same location several weeks earlier-female was caught and transmittered.
Qamea	28-May-11	Afternoon	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	Seen here reg	1	Caught 2 males in the area and saw 1 female
Qamea	2010	?	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	Seen here reg	1	Caught 2 males in the area and saw 1 female
Qamea	2009	?	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	Seen here reg	1	Caught 2 males in the area and saw 1 female
Qamea	2008	?	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	Seen here reg	1	Caught 2 males in the area and saw 1 female
Qamea	2007	?	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	Seen here reg	1	Caught 2 males in the area and saw 1 female
Qamea	2006	?	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	Seen here reg	1	Caught 2 males in the area and saw 1 female
Qamea	2010	Afternoon	Saravi	S16.76075	W179.78037	Human Dwellii	furniture	M Adult	? Resting/fora	Jone and his w	Given to Jerry	2	Caught and killed inside their house.
Qamea	16-Jun-11	morning	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone and his w	Others have re	2	I wasn't around most of the week, but evidence of feeding in this Drala tree since I was last here, and multiple people have reported seeing a large male in this tree all this week.
Qamea	17-Jun-11	Morning/Aftern	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone's wife	a lot of feedin	2	I wasn't around most of the week, but evidence of feeding in this Drala tree since I was last here, and multiple people have reported seeing a large male in this tree all this week.
Qamea	18-Jun-11	morning	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	a lot of feedin	2	I wasn't around most of the week, but evidence of feeding in this Drala tree since I was last here, and multiple people have reported seeing a large male in this tree all this week.
Qamea	19-Jun-11	Morning/Aftern	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Dickson/Ba an	a lot of feedin	2	I wasn't around most of the week, but evidence of feeding in this Drala tree since I was last here, and multiple people have reported seeing a large male in this tree all this week.
Qamea	20-Jun-11	Morning/Aftern	Saravi	S16.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Dickson/Ba an	a lot of feedin	2	I wasn't around most of the week, but evidence of feeding in this Drala tree since I was last here, and multiple people have reported seeing a large male in this tree all this week.
Qamea	16-Jun-11	Morning/Aftern	Nauradua	S16.75964	W179.77738	Riparian/Mang	Mangroves, vii	M Adult	Basking	Ronnie Willian	Also seen by C	2	Matches well with other iguana sighings seen during this period.
Qamea	14-Jun-11	Afternoon	Yaragau-east	S16.76363	W179.78894	Forested Head	Large stone	M Adult	Basking	George Willian	I have seen th	2	Plenty of activity this week.
Qamea	20-Jun-11	Afternoon	Waibulu	S16.76708	W179.77867	Riparian/Mang	Vesi vesi matt	? Adult	Basking	? 2 women fro	Reported to Je	2	Plenty of activity on this day, seems to be a genuine sighting.
Qamea	21-Jun	Afternoon	Natiro landing	S16.76726	W179.78394	Riparian/Mang	Red mangrove	? Juvenile	Basking	Lilo Surumi	Other sighting	2	Other kids have reported a similar sized iguana around this location
Qamea	16-Jun-11	16:00	Saravi	S16.76222	W179.78038	Water	Water	M Adult	Swimming	Ella (Jone's wi	Good descripti	2	Saw swimming when coming across from Vatusogosogo
Qamea	16-Jun-11	16:00	Saravi	S16.76235	W179.78082	Water	Water	M Adult	Swimming	Ella (Jone's wi	Good descripti	2	Saw swimming when coming across from Vatusogosogo
Qamea	23-Jun-11	10:00	Lovoni creek	S16.76690	W179.78212	Riparian/Mang	Vesi vesi	M med Adult	feeding/baskir	RVV	Captured and	1	Leg injury apparently from a spear thrown by kids-killed.
Qamea	**23-Jun-11**	**12:20**	**Btw Saravi a**	**S16.76307**	**W179.78337**	**Riparian/Ma**	**Red mangrov**	**M Adult**	**Basking**	**RVV**	**Captured and**	**1**	**Hurricane damage mangrove location female? Fled to water, male had plenty of fighting scars-some recent.**
Qamea	23-Jun-11	12:20	Btw Saravi an	S16.76310	W179.78341	Riparian/Mang	Red mangrove	F Adult	Basking	RVV	Escaped while	1	Hurricane damage mangrove location female? Fled to water,
Qamea	24-Jun-11	13:00	Yaroi	S16.76299	W179.78412	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	1	Large male, a female was present here also.
Qamea	24-Jun-11	13:00	Yaroi	S16.76301	W179.78414	Riparian/Mang	Red mangrove	F Adult	Basking?	RVV	Escaped to wa	1	A female very close to a male, both escaped to water-high tide.
Qamea	24-Jun-11	13:00	Yaroi	S16.76307	W179.78337	Riparian/Mang	Red mangrove	F Adult	Hiding mangr	RVV	Escaped to wa	1	A large male seen earlier.
Qamea	28-Jun-11	13:57	Saravi	S16.76161	W179.78002	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	1	A large male near Saravi-seen previously, escaped with noose around its neck. Fled to water.
Qamea	28-Jun-11	16:44	Yaroi	S16.76350	W179.78447	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Captured and	1	Believed to be same male that escaped on the 24 June 2011
Qamea	28-Jun-11	13:00	Qamea beach	resort		Rocky ridge	Rock	M Adult	Basking	George Willian	Other sighting	2	Several others seen in this location
Qamea	26-Jun-11	11:00	Naiviivi village			Human Dwellii	Ground	F Adult	?	Jerry Surumi a	Female seen h	2	Many reports of an American iguana at this site in 2010.
Qamea	30-Jun-11	13:00	Naiviivi village	S16. 77077	W179.79007	Creek	Ground	?	Walking	RVV	Track leaves c	1	Probably the same animal the kids reported seeing on the 24 June 2011
Qamea	24-Jun-11	Afternoon	Naiviivi village	S16.77079	W179.78993	Disturbed fore	Coconut palm	? Adult	Basking	Lilo, many oth	Seen by many	2	Many reports of this sighting? Female?
Qamea	1-Jul-11	15:30	Saravi			Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	1	Think I've seen this one previously.
Qamea	1-Jul-11	17:00	Yaroi	S16.76305	W179.78424	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	1	Large male took off immediately.
Qamea	6-Jul-11	15:30	Yaroi	S16.76297	W179.78404	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Captured and	1	Large male escaped previous capture attempt
Qamea	3-Jul-11	Afternoon	Yaroi	S16.76361	W179.78433	Riparian/Mang	Red mangrove	? Juvenile and	feeding/baskir	Bejju and Silw	Good descripti	2	2 iguanas seen here by Bejju etc feeding on mangrove leaves?
Qamea	8-Jul-11	15:42	Yaroi	S16.76359	W179.78444	Riparian/Mang	Red mangrove	M med Adult	Basking	RVV	Captured and	1	This is likely one of the animals seen on the 3rd July by Bejju.
Qamea	14-Jul-11	11:00	Saravi	S		Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Captured and	1	Smapped the noosed pole, had to run down across the mud flats-low tide.
Qamea	25-Jul-11	16:20	Nukubalavu	S16.75443	W179.79763	Rocky ridge	Rock	? Med Adult	Basking	RVV	Unable to get	1	30m up rocky cliff
Qamea	27-Jul-11	9:00	Lovoni	S		Riparian/Mang	Red mangrove	F Adult	Basking	RVV	6m up on edge	of mangroves	in Lovoni village. Low tide fled to ground and caught on mud flat by hand
Qamea	30-Jul-11	13:20	Saravi	S16.76222	W179.77971	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	1	Same animal that had noose break around its neck, escaped yet again.
Qamea	31-Jul-11	15:40	Naiviivi village	S16.77426	W179.79361	Littoral/beach	pawpaw	m juvenile	Basking	RVV	Captured and	1	Caught in the middle of the village close to where 4 hatchlings have been caught earlier in the year (Jan)
Qamea	1-Aug-11	Afternoon	Salia beach			Littoral/beach	ground	F Adult	Walking	Steela	Captured and	1	Gravid female caught by Steeler
Qamea	2-Aug-11	9:45	Saravi	S16.76107	W179.78029	Riparian/Mang	Red mangrove	F Adult	? Hiding	RVV	Escaped to wa	1	Gravid female, saw where it had been basking but it took cover before I got there.
Qamea	2008-2010	?	Saravi	S16.76175	W179.78015	Riparian/Mang	Merremia pelt	M Adult	Basking	Jone and his w	Repeatly seen	1	I have seen the animal they talked about 3-4 times very close to this location-noose snapped
Qamea	2-Aug-11	12:40	Yaragau	S16.76185	W179.79037	Garden	Tavola	F Adult	Basking	RVV	Captured and	1	Gravid female likely here to lay eggs (eggs were shelled 26)
Qamea	2-Aug-11	14:45	Saravi	S16.76305	W179.78425	Riparian/Mang	Red mangrove	F Adult	?	RVV	Escaped to wa	1	Escaped to water when I bumped the tree. Same tree Iguana 6 was seen in when it first escaped.
Taveuni	2009	?	Lovo ni Vonu	S16.78518	W179.98465	Riparian/Mang	?	M Adult	?	?	Fiji times new	1	Caught and killed, not sure by who.
Taveuni	14-Jun-11	Afternoon	Matei	S16.68905	W179.87501	Riparian/Mang	Red mangrove	? Young adult	Basking	Waisale/Sipira	multiple peopl	3	Reported to both Waisale and Sipirano within a couple of days, several people have seen it.
Taveuni	2010	Late morning	Qeleni	S16.73673	W179.86023	Ground	Road	? Adult	Walking	Bus load of pe	Good detail fr	2	Many reports of this animal-still alive.
Taveuni	2010	?	Qeleni	S16.73942	W179.85892	Riparian/Mang	?	? Adult	Basking	?	Reported by S	3	Someone Sipirano knows saw this animal-I didn't interview them just got information from Sipi.
Taveuni	2009	Afternoon	Wai bula	S16.77675	W179.84126	Ground	river crossing/	? Adult	Basking	?	Reported by S	2	Right on the wai bula river-reports sound credible.
Taveuni	2010	13:30	Vure Vure	S16.80093	W179.85238	Ground	Boat landing	M Adult	Basking	Claude Michea	I spoke with h	1	Photographs of this animals, Claude is a biologist and is familiar with this iguana species. Possibly another sighting close to this area also.
Taveuni	Apr-11	Afternoon	Wai	S16.80596	W179.85909	Ground	Road-by creek	? Young adult	Walking	Sai (nurse at	Sipirano spoke	2	Seems to be a credible sightings-good descriptions
Taveuni	Apr-11	Afternoon	Bouma	S16.82419	W179.87163	Riparian/Mang	?	? Adult	Basking	Friends of Sipi	Sipirano repor	2	good descriptions-it fled to water when chased and escaped
Taveuni	Apr-11	Morning	Bouma	S16.82606	W179.87176	Riparian/Mang	Red mangrove	? Adult	Basking	Friends of Sipi	Sipirano repor	2	good descriptions-it fled to water when chased and escaped
Taveuni	Jul-11	?	Close to Vuna	S16.92380	W179.91259	?	?	?	?	Reported Wais	Sipirano went	4	Details on this animal not final-Waypoint just an estimate.
Taveuni	Apr-11	Afternoon	Lavena	S16.87514	W179.87798	Beach	beach	M Adult	Basking	Sipirano	Caught and kil	1	Male 162cm total length, Easter weekend. Kids chased from beach and it fled to water and was eventually caught.
Matagi	?2008	?	Resort	S16.73483	W179.75076	Non-native ga	Mango tree	Adult	Basking	Alice Heffernai	Photo	1	
Matagi	Sep-10	Afternoon	Resort	S16.73444	W179.75104	Non-native ga	Mango tree	Hatchling	Basking	Lilo Surumi/Pe	Captured and	1	Other iguanas seen in this mango tree.
Matagi	25-May-11	Afternoon	Resort	S16.73444	W179.75104	Non-native ga	Mango tree	F? Adult	Basking	Alice Heffernai	Good descripti	2	Same location Lilo and Peter caught hatchling.
Matagi	27-Apr-10	Afternoon	Horseshoe bay	S16.73435	W179.74431	Littoral/beach	ground	Adult	walking	Alice Heffernai	Photo	1	Evidence of a feed site further down the beach-Drala
Matagi	4-May-10	Afternoon	Horseshoe bay	S16.73422	W179.74498	Littoral/beach	ground	Adult	walking	Alice Heffernai	Photo	1	Could be same animal as previous record-close to Drala tree was possibly feeding there.
Matagi	Sept/Aug 201	Midday	in the sea bet	S16.74353	W179.75012	Sea	Sea	Adult	Swimming	Tomas Mitchel	Other who wer	2	Quite detailed description
Laucala	Mar-11	Afternoon	In the sea	S16.74439	W179.70394	Sea	Sea	Adult	Swimming	Oresi ? (Jerry	Good descripti	2	Oresi reported seeing another individual swimming across the same narrow stretch to Laucala in 2009.
Vanua Levu	Feb-11	Late morning	Near Karoko (i	S16.53043	W179.91167	Reef flat	coral rubble in	Small Adult	Basking	Jimmy (copra	Toraga ni koro	2	Toraga ni koro brought dead one from Qamea and Jimmy (copra producer) said I've seen one of those!

APPENDIX 2. CAPTURE DATA

Island	Site	Date	time	Weather brief	Location	Location	Tree species	Perch height	Ground	Over wate	In Water	sex	#of eggs, #of ovarian scars	svl	Total length	Wt	status-sighting, killed, desexed	behav obs	obs by	notes
Qamea	Yaragau	28-Aug-10	?	?	S16.76185	W179.79037	Tavola (Terminalia catappa)	?	no	Yes	no	F	Contained 55 shelled, oviductal eggs-weighing 15.1g each	380mm	802mm (tail broken off)	2250	Killed	?	Pete harlow	get more info
Qamea	Qamea Resort	1-Sep-10	?	?	get this from t	get this from t	?	?	?	?	?	F	Contained 34 shelled oviductal eggs, weighing 13.7g each.	316	1085	1256	Killed	?	Pete harlow	get more info
Matagi Island	Matangi Resor	8-Sep-10	?	?	get this from /	Get this from /	?	?	?	?	?	F	Contained 52 shelled oviductal eggs, weighing 15.5g each.	392	1390	2283	Killed	?	Pete harlow	get more info
Qamea	Niubalavu Set	9-Sep-10	?	?	get this Pete?	get this Pete	?	?	?	?	?	F	Contained 20 shelled oviductal eggs, weighing 12.4g each.	254	380 (tail broken)	665	Killed	?	Pete harlow	Get more info
Qamea	Yaragau	25-May-11	11-12am	O/C heavy rain	S16.76185	W179.79037	Tavola (Terminalia catappa)	12m	no	Yes	no	M	NA	get this nunia	get this nunia?	NA	Killed	resting/inactiv	RVV others	Awareness/ne
Qamea	Yaragau	25-May-11	11-12am	O/C heavy rain	S16.76136	W179.79070	Unknown	5m	no	Yes	no	F	36 unshelled oviductal follicles (eggs?), -no weight available.	get this nunia	get this nunia?	NA	Killed	resting/inactiv	RVV others	Awareness/ne
Qamea	Yaragau ridge	8-Jun	14:50	Clear sunny day	S16.76352	W179.78911	Vine matt in unknown tree	15m	no	Yes	no	F	Contained 41 shelled, oviducal eggs-weighing 12g each.	365mm	1035mm (Tail regen 2)	2400	Transmittered, killed (3 Aug 2011)	Mating/baskin	RVV	Seen at this lo
Qamea	Lovoni	23-Jun	10:00	Clear sunny day	S16.76690	W179.78212	Vesi Vesi (Pongamia sp)	6m	no	Yes	no	M	NA	270mm	970mm	700	Killed	Feeding	RVV	Large hole (he
Qamea	Between Yaroi	23-Jun	12:20	Clear sunny day	S16.76307	W179.78337	Red Mangrove	4m	no	Yes	no	M	NA	420mm	1550mm	3400	Transmittered, Desexed	Basking	RVV	A smaller igua
Qamea	Yaroi	28-Jun	16:44	Showers 60% O/C	S16.76350	W179.78447	Red Mangrove	3m	no	Yes	no	M	NA	490mm	1100mm (tail regen)	2400	Transmittered, Desexed	Basking	RVV	On
Qamea	Yaragau	2-Jul	13:00	O/C heavy rain	S16.76308	W179.78943	No	0m	Yes	no	?	M	NA	370mm	970mm	1900	Transmittered, Desexed	Walking	RVV others	Thought to be
Qamea	Yaroi	6-Jul	15:30	Sunny day, 40% C	S16.76297	W179.78404	Red Mangrove	5m	no	Yes	no	M	NA	480mm	131mm	3500	Transmittered, Desexed	Basking	RVV	Lying on top o
Qamea	Yaroi	8-Jul	15:42	Some sunny perio	S16.76359	W179.78444	Red Mangrove	3m	no	Yes	no	M	NA	300mm	720mm (tail broken-piece r	800	Transmittered, Desexed	Basking	RVV	Lying on top o
Qamea	Saravi	14-Jul	11:00	40-60% O/C wind	S16.76214	W179.78994	Red Mangrove	5m	no	Yes	yes-captured i	M	NA	450mm	1440 (tail regen 2)	4500	Desexed	Basking	RVV	Top of mangro
Qamea	Lovoni	27-Jul	9:00	100% O/C rain ne	S16.76696	W179.782123	Red Mangrove	5m	no	Yes	no	F	Contained 29 shelled oviductal eggs, weighing 13.4g each.	300mm	73mm (Regen-recent 2)	1400	Killed? (date?)	resting/inactiv	RVV others	Top of mangro
Qamea	Naiviivi	31-Jul	15:40	Clear sunny day	S16.77034	W179.78883	Paw paw tree	3.5m	no	no-2m from b	no	M	NA	130mm	500mm	200	Killed (3 Aug 2011)	Basking	RVV	Top of pawpaw
Qamea	Salia	1-Aug	14:00-16:00	Clear sunny day	get from goog	get from goog	No	0m	Yes	No-on the bea	no	F	Contained 26 unshelled, oviductal eggs-weighing 7g each.	300mm	1000mm (Regen)	1200	Killed (3 Aug 2011)	Walking	RVV others	Walking along
Qamea	Yaragau	2-Aug	12:40	Clear sunny day	S16.76185	W179.79037	Tavola (Terminalia catappa)	8m	no	Yes	no	F	Contained 24 shelled, oviductal eggs-weighing 9g each.	300mm	88mm (Regen)	900	Killed (3 Aug 2011)	resting/inactiv	RVV	Appears to hav

ANNEX 8

AMERICAN IGUANA *IGUANA IGUANA*

TEMPORARY BIOSECURITY OFFICERS DEBRIEF

01ST SEPTEMBER 2011

AMERICAN IGUANA *(Iguana iguana)*

Temporary Biosecurity Officers - Debrief

Report Prepared By:

Nunia Thomas, Anna Sahai, Ilaisa Dakaica (BAF)

Report Number: 2011/13

Date: 01st September 2011

Authorised By:

Nunia Thomas M.Sc.

Signature:

Position: Conservation Coordinator.

NatureFiji-MareqetiViti
14 Hamilton Beattie St., Suva, Fiji.

COMMUNICATION RECORD

14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

Date:	Time:	Location:
1/9/2011	9am	Mua Agricultural Station

☐ Telephone Call ☐ Meeting ☐ Site Visit ☐ Other Meeting

NFMV Staff	Anna Sahai, Nunia Thomas, Waisale Mataitoga	Project id	MV17
Other Parties:	Biosecurity, Mins. Agriculture, Cakaudrove Provincial Office, Turaga ni koros (see attendance register).		
Subject:	Installment of Temporary Biosecurity Officers for the American iguana eradication campaign.		

Details

Meeting at Mua for Temporary Biosecurity Officers
1/9/2011

Venue: Mua Agriculture Station, Taveuni
Time: 9 am

- The meeting began at 9:30am with all seated in the meeting.
- The meeting was opened with a prayer.
- Mr Waisale Mataitoga and Nunia Thomas then addressed the participants at the meeting. They gave a brief outline of what had been done so far and what the agenda for the day was.

1.0 RokoTui's address:

- The Roko Tui Cakaudrove, Ro Aca Mataitini was then asked to address the meeting.
    - He addressed the participants, reminding them of the importance of their work and that they need to take a more serious approach to this issue and inform the villagers of what they can do to help with this problem and for them as Temporary Biosecurity Officers to carry out their duties diligently.
    - He stated that the presence of the officer from the Biosecurity Authority of Fiji showed the seriousness of this issue and that we all needed to work together now to help eradicate this American Iguana.
    - He thanked NatureFiji-MareqetiViti and Biosecurity Authority of Fiji for all the work they have put in so far over the months and for taking the initiative to come to Taveuni and train and raise awareness amongst the people.
    - He also stated that he will be visiting the different villages and seeing if the TBO are doing their jobs well and informing the people.
    - He said that any type of gatherings such as church or yaqona can be used to raise awareness amongst people; even teachers can be used to educate the children on this issue.
    - He said that the Cakaudrove people are willing to help both BAF and NFMV tackle this problem.

2.0 Updates from the American iguana eradication campaign task force

- Nunia then addressed the participant s and informed them on the latest updates from the Taskforce. She went through Rick Van Veen's report and highlighted the main points and also the suggestions from this report.

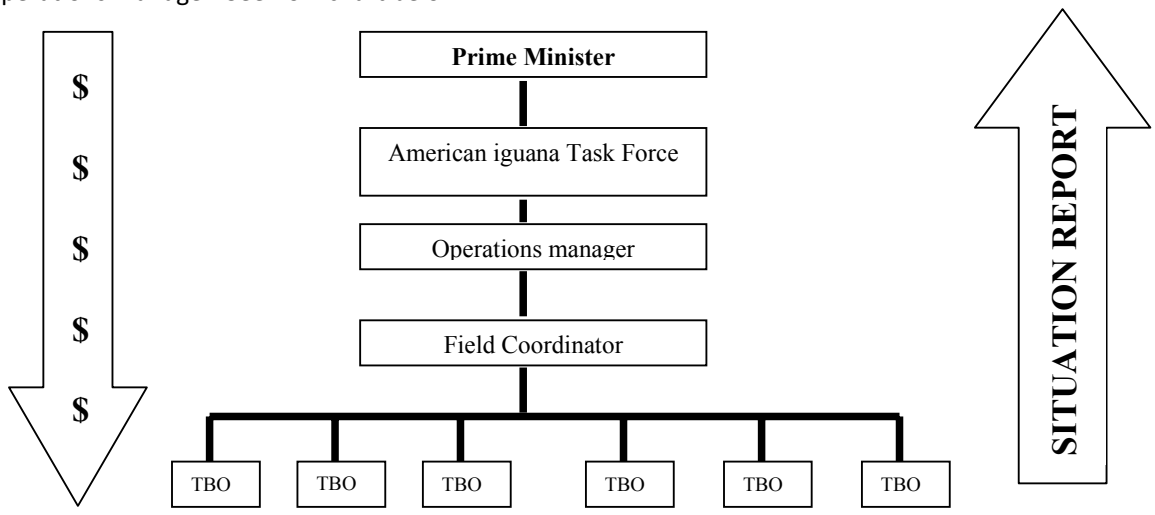
14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

3.0 Issues discussed

1. Training could be conducted for other places that want people trained to identify nesting grounds
2. Guns could be used to kill iguanas seen near the beach
3. Could they be injected with something to kill them?-NT said this could be dangerous for children if a needle were to accidently prick a child. The risk to human safety is too high for this.
4. Can a copy of Rick Van Veen's report be sent to all the villages?
5. Is the Fiji Iguana here in Taveuni and do they have a lot of eggs? –NT said that yes they are here and they lay only about 4-6 eggs
6. Can the predator that is in Jamaica be brought here?- NT said this could have more detrimental effects, they could become invasive and cause another problem.
7. Jerry explained how the Iguana are seen eating cabbages
8. It would be good to take photo's of what the Iguana eats and damages and it to the villages
9. Jerry Sarumi stated that these iguana eat what we eat so that's why we need to eradicate them
10. What's the percentage of eggs that survive? –NT said we do not know this data
11. Can this campaign be brought to all parts of Taveuni?
12. What is happening to Laucala Island? –NT explained that there have been reports but access to the island has not been granted.
13. Government needs to take action with Laucala and Matagi.
14. There have been reports of sightings from Tukavesi and Buca
15. It would be good to take all the turaga ni koro's from around Taveuni and Naiviivi around to show them the damage done by these Iguanas. NT said that the damage is not really visible and hard to detect, they can't be seen straight away.
16. Could a scholarship be created for a student to study this AI?

4.0 Biosecurity Presentation

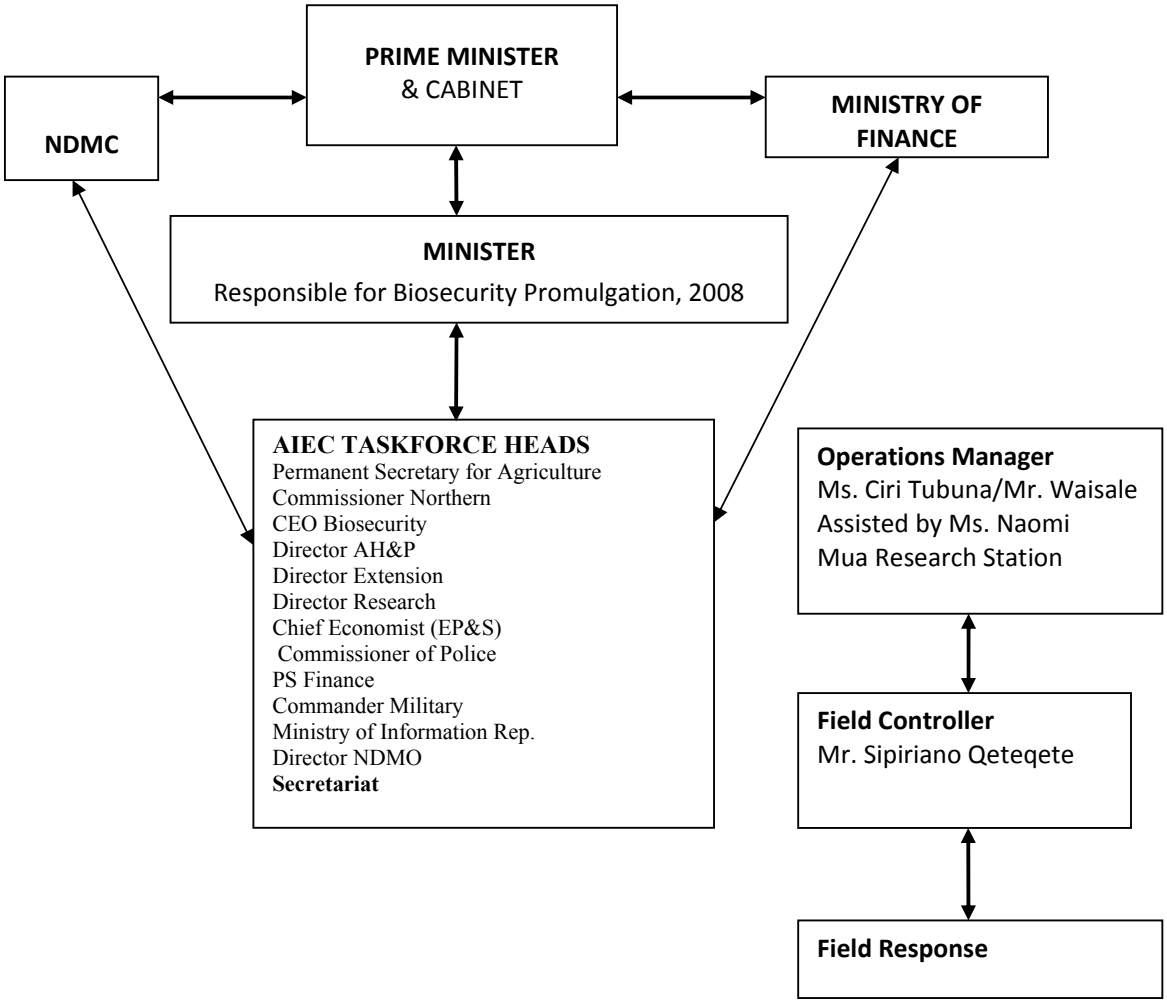
1. Then Ilaisa Dakaica explained to the participants how the TBO position would work and what they could do while being TBO.
2. He also explained to them how they would have to send in weekly reports of the work that they carry out during the week. He also explained the importance of sending in these reports so that funds will be made available for the work done, only once reports are sent in only then can funds be released.
3. He then explained how the TBO'S are to report to the Field Coordinator, who will then report to the operations manager. See flow chart below.



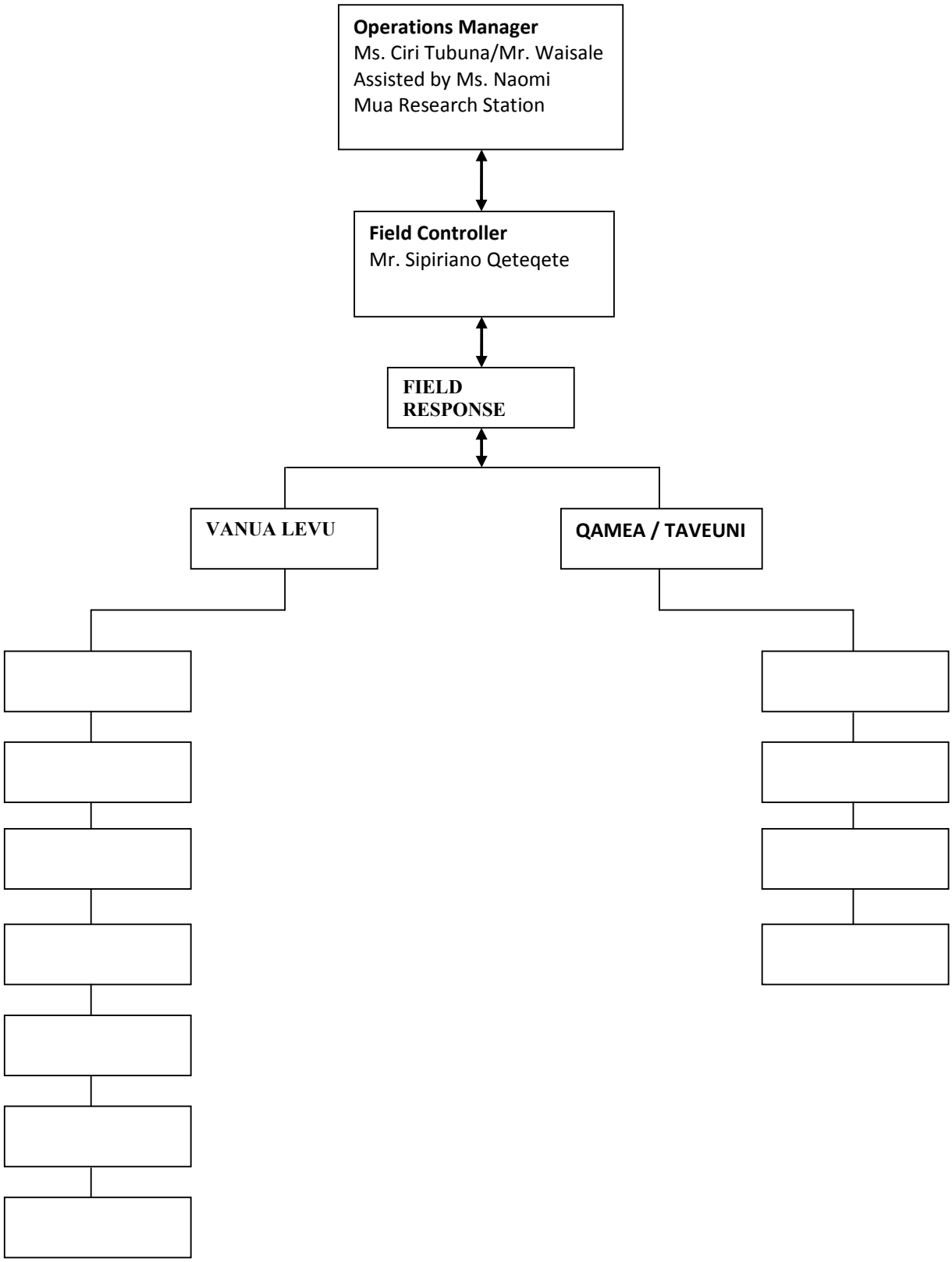
14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

4. Once the operations manager has received all the reports, the operations manager will then report to the Taskforce who will then report to the Prime Minister's office.
5. Illustrated below is the operational communications structure.

AMERICAN IGUANA ERADICATION CAMPAIGN
OPERATIONAL PROCEDURES AND COMMUNICATIONS



14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org



14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

1. Channel of communication as depicted in the above schematic
2. Communication established through mobile phone, email and fax.
3. Situation Reports (SITREP) submitted on weekly basis. This is due to the difficulty in travelling and communications in the vast area of operations. [Circulated by Secretariat]
4. Attendance register must be entered by individual members daily (Time in 0800hrs and time out 1630hrs). Daily attendance must be checked, verified by the Field Coordinator and signed-off by the Operation Manager.

5.0 Issues discussed

1. It was discussed that the Operations Manager will be a current agricultural officer, as this will make it easier to access vehicles and government facilities.
2. Ilaisa also explained what a situation report should contain; weather, how many houses visited, damage seen. This report is to be done daily.
3. Then it was discussed that the Field Coordinator who will be Sipiriano Qeteqete will visit VanuaLevu and Qamea as scheduled and collect reports which will then be taken to the office at Mua and sent over to the TaskForce.

6.0 Equipment needed

1. 7 mobiles + recharge/week ($20) for Vanualevu TBO

Name	**Monitoring site**	**Equipment needed**								
		Mobile phone	**Recharge card ($20/ week)**	**Gumboots (Shoe size)**	**Raincoats**	**Gloves**	**Clip boards**	**Pencils**	**Head torches**	**Binoculars**
Beni Raceva	Coastal forest around Buca village		Yes (Vodafone)	11	XL	Yes	Yes	Yes	Yes	Yes
Seba Sitiano R.	Lavena – coastal walk route			11	XXL	Yes	Yes	Yes	Yes	Yes
Nemasio Naulu	Koroivonu – Tuvuimila estate	Needs Vodafone	Yes	11.5	XL	Yes	Yes	Yes	Yes	Yes
Inoke Koli	Togo – Onodere, Niubavu, Vunivesi		Yes (Vodafone)	8 (safety boot size)	XL	Yes	Yes	Yes	Yes	Yes
Jerry Surumi	Naiviivi – Natiro – Naiviivi Primary school	Needs Vodafone	Yes			Yes	Yes	Yes	Yes	Yes
Paulo Nete	Naiviivi – same as above	Needs Vodafone	Yes			Yes	Yes	Yes	Yes	Yes
Sipiriano Qeteqete	Field Coordinator	Prefer TFL dual sim to be		10.5	XXL	Yes	Yes	Yes	Yes	Yes

14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

		able to contact both TFL numbers and Vodafone numbers.								
Waisale Mataitoga	Awareness coordinator		Yes (Innk)		XXXL	No	No	No	No	No

7.0 Issues discussed

1. The guidelines need to be reviewed
2. Poster – needs to have a photo of both a male and female
3. A live specimen could be taken around to show villages
4. Photos of the eggs need to be added to the poster-egg photo from the handbook could be used

The meeting was closed at 4pm.

Actions to be undertaken:

1.0 Roko Tui's address

a. Roko Tui to visit village in the province, and follow up on whether TBOs have been conducting their duties or not (**Roko Tui**)
b. TBOs to take advantage of any opportunity to talk about what they are doing in Taveuni (**TBOs**)

3.0 Updates from the task force (issues discussed)

c. Training of other Turaga ni koros of Taveuni to be conducted as soon as possible within this nesting season (**NFMV**)
d. Circulate a copy of Rick Van Veen's report to Turaga ni koros (**NFMV**)
e. Possibility of have government sponsored post graduate student/ masters student to be considered seriously (**Task Force**)

5.0 Biosecurity Presentation

f. Nunia and Ilaisa to develop data sheet for TBOs (**NFMV, Biosecurity)**
g. TBOs are to write daily reports and submit to Mua (**TBOs**)
h. TBOs from Vanua Levu are to fax in their weekly reports to Mua by Thursday of each week. Either from Cakaudrove Provincial Office (fax 8853520) or from Tukavesi Post Office. (**TBOs**)
i. Sipiriano Qeteqete (Field coordinator) to collect data from TBOs in Qamea island every Thursday each week and submit to Mua. (**Field Coordinator**)
j. Operations manager (Mua) to submit weekly reports to Suva. (**Operations Manager**)
k. TBOs to update Field coordinator on work plans (**TBOs**)

5.0 Issues discussed

l. Operations manager to be from Agriculture Division, Taveuni. Waisale Mataitoga will not be able to fulfil this role. (**Agriculture, Taveuni**)
m. Sipiriano and Nunia to put together visitations schedule to TBOs (**see TBOs workplan attached**).

14 Hamilton-Beattie Street, Suva, Fiji
Box 2041, Government Buildings, Suva, Fiji
Tel +679 3100598 Fax +679 3100582
email support@naturefiji.org
website www.naturefiji.org

6.0 Equipment needed

n. Equipment listed to be sent to TBOs. (**Biosecurity**)
o. Field guides (booklet) to be re-done (**NFMV**)
p. Add female and male picture of iguanas to booklet (**NFMV**)
q. Add photos of egg to the booklet. (**NFMV**)

Biosecurity is to cover the costs of mobilizing the TBOs; and organizing their equipment and payment for the collection and submission of data at Mua.

I

AMERICAN IGUANA (*IGUANA IGUANA*) NESTING BEACH MONITORING: TRAINING OF TEMPORARY BIOSECURITY OFFICERS

[ANNEX 9]

AUGUST–SEPTEMBER 2011

ACKNOWLEDGEMENTS

We are indebted to the members of the American Iguana Eradication Campaign task force and the Biosecurity Authority of Fiji for their continued support for the research and awareness aspect of this eradication campaign.

The positive response and assistance from the Cakaudrove Provincial Office, the Roko Tui Cakaudrove (Ro Aca Mataitini) and his staff has been crucial to the enthusiastic participation of the village headmen and their respective teams in monitoring potential American iguana nesting sites.

Continued technical advice from the Pacific Invasives Initiative has helped the NatureFiji-MareqetiViti team and Sipiriano Qeteqete (National Trust of Fiji) translate and communicate the research results to the task force and communities.

Lastly but not least, we sincerely thank those who have volunteered their time into monitoring potential nest sites and those individuals who have volunteered information to the awareness and research team and provided assistance to the monitoring teams.

The research and awareness aspect of the American Iguana Eradication Campaign have been jointly funded by the Critical Ecosystems Partnership Fund and the Biosecurity Authority of Fiji.

SUMMARY

Four series of nesting beach monitoring technique training have been conducted in Qamea, Taveuni and Buca Bay (Vanua Levu). Fourteen Temporary Biosecurity Officers (TBOs) have been confirmed. There are now one hundred and eight individuals who have undergone this training and are currently monitoring potential nesting beaches in the training sites mentioned above.

Data sheets, field notebooks and American iguana field guides were distributed at these training sessions. The field coordinator, Sipiriano Qeteqete visits monitoring sites fortnightly, and sends his reports to the NFMV office.

Fifty possible nesting beaches have been identified (Qamea, Taveuni, Laucala, Vanua Levu, Rabi Kioa), of which four are confirmed nesting sites (on Qamea and Matagi island only). There has been no nesting site reported from Taveuni. With the exception of Laucala Island, forty-nine possible nesting sites are being monitored daily.

Urgent actions required:

1. Renewal of expired TBO identification cards (till December 2011)
2. Confirmation of unconfirmed TBOs to allow them to prove to concerned citizens of their role.
3. Equipment for the field coordinator and volunteers who have been monitoring potential nesting beaches.
4. Set up the Mua office and personnel (data manager).
5. Tighten biosecurity control between Taveuni and Qamea/ Matagi. Even though the iguanas are not breeding on Taveuni, they can still swim between the islands.

Monitoring data is currently being entered by NFMV volunteers. These will be handed over to BAF once a user-friendly system is developed. TBO allowances can be ascertained from these data.

1.0 INTRODUCTION

1.1 Background

In May 2011, NatureFiji-MareqetiViti (NFMV) trialed training volunteers from Taveuni, Qamea and Vanua Levu on methods of monitoring nesting beaches in preparation for the nesting period of the American iguanas in Fiji (June – September). Also at the training was contracted herpetologist Rick Van Veen to begin his 3 months research on Qamea Island to ascertain iguana behaviour on the island.

At the end of Rick's 3 months (May - August 2011), he confirmed that the nesting season had begun and that the volunteers who had undergone training needed to be appointed as Temporary Biosecurity Officers (TBOs) and mobilized (Van Veen, 2011).

At the appointment ceremony of the TBOs (Thomas *et al* 2011), the Cakaudrove provincial office and village representatives from other parts of Taveuni requested that the nesting beach monitoring training be conducted to all villages in Taveuni; that TBOs be appointed in each village and that these TBOs monitor potential nesting beaches on Taveuni.

Furthermore, Van Veen (2011) recommended that the eradication and monitoring in 2011 ensures that any nesting beaches on Taveuni (if any) is identified and monitored and that any gravid female is captured and killed. The American iguana must not, at any time, breed on the island of Taveuni.

For this reason, the NFMV awareness team recommended to the BAF that the Cakaudrove Provincial Office's request be granted (Thomas *et al* 2011) and a TBO training session be held for the island of Taveuni; and also for the eastern coast of Vanua Levu facing Taveuni.

This document reports on the names and monitoring sites of the nominted TBOS for Taveuni and Vanua Levu as well as key issues raised by the attendees of the training sessions.

2.0 METHODS

Consultations prior to the training were conducted by Waisale Mataitoga and Sipiriano Qeteqete with the Cakaudrove Provincial Office and village headmen. Iguana specimens for the training were captured and brought in by TBOs Jerry Surumi (Naiviivi) and Inoke Koli (Togo), both of Qamea Island.

Mr. Suliasi Tawake, Operations manager of BAF; and representatives from the Ministry of Agriculture were also present at the training.

Dr. James Stanford, USGS Brown Tree Snake Rapid Response Unit Team Leader was also present as an observer.

The training was conducted in Nakorovou and Navakawau, Vuna for Taveuni (15th and 16th September 2011) and Tukavesi, Buca Bay for Vanua Levu (29th September 2011).

2.1 Training materials

American iguana nesting beach field guides (1/2 A4 size) were developed and printed (Appendix 1). The Eradication strategy (Harlow and Thomas 2010) and Rick Van Veen's report (Van Veen 2011) were printed out and distributed so that each village had a copy.

Field notebooks and pencils were purchased for the participants. Data sheets for monitoring nesting beaches and killing captured iguanas (Appendix 2) were also compiled and printed.

2.2 Nesting beach sites identification and monitoring

Participants were seated in village groups (monitoring teams) and asked to identify potential nesting beaches in their village vicinity at the end of the presentation on ideal American iguana nesting sites. The teams then allocated individuals to monitor identified potential nesting sites.

3.0 RESULTS

3.1 TBO training, Taveuni

Fifty seven individuals representing twenty villages and settlements from the Tikina of Cakaudrove, Vuna, Laucala and Wainikeli (including Qamea Island) attended the training session in Nakorovou Village (Appendix 3 Table 1). Of these, eleven were women from the villages of Vurevure, Kanacea, Korovou, Nakorovou, Vuna and Togo.

Attendance at Navakawau village was not taken as the whole village attended presentation before a separate session was held for the six individuals who volunteered to participate in the nesting beach monitoring (Appendix 3 Table 2).

At the Tukavesi training session, fourteen villages (including the islands of Rabi and Kioa) were

represented by fifty seven individuals (Appendix 3 Table 3). Of these eight were women from the villages of Tukavesi, Buca and Karoko and the island of Rabi.

Forty-one monitoring sites and thirty-seven monitoring personnel were identified (Appendix 4). It was agreed that the village headmen - Turaga ni koro (TK) be leaders of each monitoring site. The participants requested that they be issued ID cards to allow them to explain the purpose of their monitoring to private land owners and concerned citizens. Photographs of attendees were taken to be submitted to BAF for Temporary Biosecurity Officer ID cards.

Key issues raised

Below are some questions and key issues that were raised. The meeting notes from the Nakarovou session can be found in Appendix 5.

What food does the American iguana eat?

The participants were asked to refer to Rick Van Veen's report. It was reiterated that the information gathered by Rick was from villagers' observations in addition to his own.

Why is the government so concerned about eradicating the American iguana?

Potential threats and identified threats in other parts of the iguana's introduced range were explained.

What if a bounty was put up for the American iguana?

The participants were informed that the task force has considered this option.

Are there any predators; could the mongoose or snake be a predator?

There are no known predators of the American iguana in Fiji. However, snakes and mongoose could possibly prey on young/ juvenile iguanas. The mongoose must never be introduced Taveuni.

Can American iguanas come into homes and village?

Reports from Naiviivi suggest that this is possible; and that they have already begun to do this.

Equipment

The participants asked if they could be provided with safety equipment and clothing for the monitoring. This is particularly important for those that will be monitoring around mangrove areas. These equipment include: safety glasses, safety boots/ gum boots, raincoats and binoculars.

Will there be any allowance for transportation (for the weekly delivery of reports)?

This will have to be sorted out with the BAF.

The monitoring team from Buca bay suggested that the field coordinator, Sipiriano Qeteqete, collect the data sheets from them rather than them (the TBOs) faxing it over to Mua. Travelling to the Tukavesi post office and faxing the pages through is too costly.

3.2 Demonstration of killing an American iguana

This task was performed by Jerry Surumi on three of the four captured iguanas. Record of the demonstration can be found in Appendix 6. Further information will be provided through Jerry Surumi's data sheet.

4.0 RECOMMENDATIONS

4.1 Nesting site monitoring

A total of 24 potential nesting sites have been identified for Taveuni and 17 for Buca Bay. These all need to be monitored by well-equipped personnel.

4.2 Support for personnel

To date 49 potential nesting beaches have been identified on Taveuni, Qamea, Matagi, Buca Bay, Rabi and Kioa (Appendix 4). Of these, four have been confirmed as nesting beaches on Qamea Island (Naiviivi, Yaragau and Niubavu) and Matagi Island. The monitoring of these potential and confirmed nesting beaches is essential to mapping out the activities for 2012.

After this first series of nesting beach monitoring training (Naiviivi, May; Vuna, September; Tukavesi, September), we now have 108 individuals equipped with knowledge on how to monitor a potential and confirmed nesting beach, capture and kill an iguana. However, they also need to be able to send in their data to the task force and be motivated to continue their work.

The monitoring is supervised by the Turaga ni koro who then submits the data to the Mua Agriculture Station. Some costs that will need to be met are:

1. Transportation costs for the delivery of data sheets to the Mua agriculture station.

2. Transportation costs for the field coordinator will need to be sorted. As his work plan suggests (Appendix 7), he travels every fortnightly to collect data sheets from Vanua Levu and Qamea; and also to discuss with TBOs any issues that they may have. These allow the team to better design and implement the nesting beach monitoring techniques. How will his costs be covered? Will these continue to be paid out in advance from NFMV and then be reimbursed by BAF?

3. Payment to TBOs. This issue needs to be discussed and resolved by BAF. Data sheets have been received by NFMV. These are currently being entered and will be submitted for BAF's records.

4.3 Field equipment

Priority equipment, as recommended by Van Veen (2011) and Thomas *et al* (2011), is:

- GPS unit – one of these for the field coordinator, who then will take GPS points of the confirmed nests and sightings. These points can then be mapped out for 2012.
- Recharge cards – a recharge card of $5/ week to be sent to the Turaga ni koros to allow them to remain in contact with the field coordinator and NFMV/ BAF. NFMV has received frequent updates and queries from the TBOs in this manner. This should be encouraged to ensure that any urgent issues are taken care of immediately.
- Dual mode mobile phone for the field coordinator. The field coordinator has recommended that this phone be purchased for his use. This will be cheaper in the long run as TBO phone numbers are Digicel/ Vodafone/ TFL numbers. Quotations for the phone are attached (Appendix 8)
- Binoculars – one pair per site.
- Equipment for the TBOs. A list of these is attached. The names of the TBOs and their shoe size and raincoat size are attached (Appendix 9).

4.3 Data entry

Data entry is currently being done by NFMV in Suva upon suggestion by the field coordinator, Sipiriano Qeteqete. Once we have worked out a data entry system, we hope to move this back to Mua. Before then, a data manager (as per communication structure provided by BAF in Thomas *et al.* 2011) will need to be appointed by BAF or be recommended by NFMV and the field coordinator.

5. REFERENCES

Harlow, P. and N. Thomas. 2010. American iguana Eradication Project: Herpetologists' Final Report. *NFMV report 2010/08*. NatureFiji-MareqetiViti, Suva.

Thomas, N, A. Sahai and I. Dakaica. 2011. American iguana (*Iguana iguana*) Temporary Biosecurity Officers Debrief. *NFMV Report 2011/13*. NatureFiji-MareqetiViti, Suva

Van Veen, R. 2011. Status Report: The American iguana *Iguana iguana* in Fiji – May – August 2011. Report prepared for NatureFiji-MareqetiViti and the American Iguana Eradication Task Force. *NFMV report 2011/10*. NatureFiji-MareqetiViti, Suva.

Track of an American iguana which walked along the beach crest, down across the beach flat at low tide and swam out to sea, possibly headed to Yaragau from Naiviivi.

ANNEX 10

American iguanas - pests not pets

The American iguana is declared a pest in Fiji. It is said to have been brought illegally into the country and released on Qamea Island in 2000. Now the American iguana can not only be found in Qamea but also in Savusavu, Taveuni and Kioa and Rotuma Islands. In 2010, these four islands were declared as a "Biosecurity Zone". This prohibits the transporting of American iguanas to other parts of the country. An American iguana eradication programme has also been set up to oversee the eradication of the American iguanas in Fiji. However, eradication is not possible without help from the public.

Source: BIODIVERSITY AUTHORITY OF FIJI

If there is one message that the Biosecurity Authority of Fiji (BAF) would like to give spell out to the people about the American iguana is that people should stop moving these creatures from Qamea, Laucala, Taveuni and Matagi islands to other parts of the country. The American iguana is not a pet it's a pest.

It is thought to have been illegally brought into Fiji in 2000 and let loose on Qamea Island. Ten years later, the pest has spread to Laucala Island, Taveuni and Matagi Island as well. If the American iguanas are not controlled and eradicated it could be disastrous for our environment, biodiversity, food security and the economy.

American iguanas are native to Central and South America. Not only has it been declared a pest in Fiji but in other countries as well because of the damage it causes to the environment and biodiversity of these countries. It is a pest in South Florida and Rio Grande Valley in Texas and an invasive species in Maui and Oahu in Hawaii.

Unlike the native Fiji iguanas, the adult American iguanas can grow almost two metres in length and weigh in at nine kilograms. They are green and may also appear bluish with black markings. Adult American iguanas have long dangerous spines along their backs and tails and long sharp claws, which they use to defend themselves. They also have long flaps of saggy skin hanging from their chin to the base of their necks, which is called a dewlap.

On each sides of their cheeks they have a large scale underneath their tympanums (a slightly sunken leathery covering of their eardrums). This large scale is a key identification feature for the beans and yam vines. If American iguana numbers are left unchecked, food sustainability in Fijian villages will be at great risk in the near future. Large numbers of American iguanas would devastate the environment around the villages and cause unpredictable economic hardship.

These iguanas could also affect Fiji's biodiversity having a serious impact on endemic plants and bird eggs and nestlings. They pose a risk to our endangered native iguanas through the possible transmission of iguana-specific parasites and pathogens from American iguanas to the endemic Fijian iguanas.

In 2010, an American iguana eradication campaign taskforce was set-up. The taskforce included members from the Biosecurity Authority of Fiji (BAF), Animal Health and Production Division, Secretariat of the Pacific Community (SPC), Department of Environment, members from Nature Fiji and the Department of Forestry.

Since the formation of the taskforce, the Nature Fiji-MareqetiViti has conducted a number of community outreach programmes on Qamea, Matagi and Taveuni Islands islands highlighting the potential harm American iguanas could do to Fiji's endemic iguanas, the tourism industry, village vegetable gardens and the thriving agricultural industry on Taveuni. Experts Dr. Peter Harlow from Taronga Zoo and Dr. Rob Fisher from United States Geoscience Survey (USGS) also visited Qamea and Matagi islands to conduct surveys.

Recent surveys show that the American iguana population is growing on Qamea, Matagi and Laucala islands. The eradication of these iguanas is a challenge as they are arboreal (tree dwelling), well

Fiji Times — Saturday July 30th, 2011

www.fijitimes.com.fj

Ministry works to exterminate iguana

Agriculture Department permanent secretary Colonel Masen Smith with the American iguana that was confiscated from Qamea Island two weeks ago.

Picture: MINISTRY OF PRIMARY INDUSTRIES

By IOANE BURESE

THE Agriculture Department and Mareqeti Viti are pleading with people on Taveuni and neighbouring islands to work with them on the ongoing Iguana Eradication Program.

Agriculture permanent secretary Colonel Masen Smith said it was now more important for the villagers to keep a lookout for the American iguana because this was their nesting season.

"The Government is pretty serious about the future of the islanders, so that is why we want the islanders to work with us during this eradication period," said Col. Smith.

"Billboards will soon be set up at the main ports of entry around the country and particularly on Taveuni so that people will read and understand the risks these American iguanas pose to the natural vegetation on the island."

The Biosecurity Promulgation is still in place and officers involved in the eradication program have legal powers to confiscate or destroy the pests on sight.

Waisale Malaitoga, Mareqeti Viti co-ordinator based on Taveuni, said the American iguana could lay up to 80 eggs, so if the eradication programme was not carried out well, its population could increase in the next five years.

"There is a tendency that people see them as pets when they are young but when they grow they turn from a pet to a pest," he said.

"From our findings in Qamea, they are eating vegetables like dalo leaves, pawpaw leaves and even breadfruit leaves. We have conducted our first round of awareness programs and have completed the islands of Lamaia, Matangi and Qamea. We have also covered Tunuloa District, East Coast, Rabi and Kioa as well as neighbouring islands."

State steps up iguana fight

American iguanas captured in Taveuni are caged at the Koronivia Research Station in Nausori. Picture: ELIKI NUKUTABU

By SAMISONI NABULIVALU

THE appointment of 14 volunteers as temporary biosecurity officers and the setting up an office at the Taveuni Coconut Centre in Waa are some recent steps Government has taken in its American iguana eradication campaign.

In a statement from the Ministry of Primary Industries, permanent secretary for Agriculture Colonel Mason Smith confirmed the decision was reached at a recent meeting in Suva with stakeholders from the Biosecurity Authority of Fiji (BAF) and Nature Fiji-Mareqeti Viti (NFMV).

Col Smith said, "Volunteers trained by NFMV will be stationed in their villages and besides collecting data, they'll have legal powers to confiscate and destroy the iguanas".

He added the office in Waa would be the initial reporting point and data collection centre and coordinate the work of the volunteers.

"Government is stepping up the campaign to eradicate the iguanas as the animal nears nesting season and all stakeholders are urged to assist in the campaign," Col Smith said.

'I am indeed grateful for the assistance we have received from Nature Fiji/Mareqeti Viti; and especially from Rick Van Veen, the specialist who has been working with us over the past three months; Nunia Thomas, Waisale Mataitoga, Jerry Sururi, the Cakaudrove Provincial Council, the district officers, police and all the local communities and stakeholders in areas infested with these pests'

— MASON SMITH

Volunteers

sought in war on iguanas

Source: MINISTRY OF PRIMARY INDUSTRIES

Permanent Secretary for Agriculture Mason Smith says the Government is stepping up its campaign to eradicate the American Iguana (Iguana iguana) following a recent meeting with stakeholders from the Biosecurity Authority of Fiji (BAF) and Nature Fiji/Mareqeti Viti that was held in Suva this week.

"We have agreed on a list of immediate actions pertaining to the ongoing work that is needed to eradicate and or control the spread of the American iguanas," Mr. Smith said.

"The first is the appointment of 14 volunteers who have been trained by Nature Fiji/Mareqeti Viti.

"These volunteers, who will be stationed in their respective villages, will be appointed as temporary Biosecurity Officers and will have legal powers to confiscate and destroy these pests. Volunteers will also continue with data collection.

"We will also set up an office at the Taveuni Civic Centre in Mua which will be the focal reporting point and data collection centre for the eradication and or containment of the American iguana.

"The office will also co-ordinate the work of volunteers.

"I am indeed grateful for the assistance we have received from Nature Fiji/Mareqeti Viti and especially from Nick Van Veen, the specialist who has been working with us over the past three months, Nasia Thomas, Waisale Malaitoga, Jerry Baruni, the Cakaudrove Provincial Council, the district officers, police and all the local communities and stakeholders in areas infested with these pests."

Government is stepping up its campaign to eradicate the iguanas as they are ready to go into their breeding season.

"The option of using trained sniffer dogs to track and destroy these pests is also being explored," Mr Smith said.

"Likewise the use of appropriate firearms is being discussed with relevant authorities.

"Additional resources such as kayaks will be hired to assist volunteers in their work and as part of the awareness strategy, billboards will soon be erected at major seaports and airports advising the public on how they can assist in stopping the movement and spread of these iguanas and where to report to should they see an iguana.

"A further meeting has also been scheduled for [illegible] September at Mua for the 14 volunteers along with Nature Fiji/Mareqeti Viti, BAF, DOA, the Provincial Council, the district officers, [illegible] and other stakeholders to brief and update stakeholders on the ongoing eradication work that is required."

The American Iguana was believed to have been introduced to Qamea Island near Taveuni in 2000 and have spread to the nearby islands of Matagi, Laucala and Taveuni.

The first adult iguana was photographed on Matagi Island in [illegible] and this alerted the authorities of the presence of these invasive species of iguana in Fiji.

A joint survey undertaken by [illegible], the Department of Environment, BAF and the National Trust of Fiji in that year confirmed the presence of these feral American iguanas on Qamea.

Since then the DOA, BAF and Nature Fiji/Mareqeti Viti have been working together to try and eradicate these pests.

American iguanas are herbivores and have been declared as a Biosecurity risk to Fiji.

Any person caught with an American iguana or its eggs in their possession will be liable for a fine up to a maximum of FJD[illegible]. A corporate body such as a resort or hotel, caught with a captive or American iguanas in their possession is liable for a fine up to a maximum of FJD[illegible].

The Department of Agriculture is calling on all stakeholders to assist in the eradication campaign.

Iguana hunt

By CAROLINE RATUCADRA

Villages along the coast of Natewa peninsula in Vanua Levu and Rabi Island have been advised to keep a look out for American iguanas.

Village headmen in the Natewa district, youth and women representatives including civil servants were part of an iguana eradication workshop in Tukavesi Village this week. NatureFiji-MareqetiViti conservation co-ordinator Nania Thomas said the awareness sessions on the eradication of the introduced animal moved on to the mainland.

Ms Thomas said the population of this introduced iguana species was growing fast and spreading rapidly. This is their nesting season now and a large number of gravid females have been caught and killed. At the workshop, the participants were taught how to identify iguana tracks, how to catch them and the proper method of killing them.

"The participants will return to their own villages and communities and transfer the knowledge learned to the people. They will also have a monitoring plan where they identify possible nesting areas and keep a watch," Ms Thomas said.

Most of the participants were frightened of the animal before the workshop, however, their fears were no more after they personally handled the animal.

Ms Thomas said the intention was to try and help those in the community overcome their fears and also help others.

"It is only human nature to be scared of this animal but we have told them if they find one, don't try to catch it alone but form a group and act."

The participants were informed that confirmed locations for the iguana are Qamea and Matang islands in Cakaudrove.

Ms Thomas said they had identified potential nesting areas for the female iguana population which includes sandy beaches, dry and sheltered areas.

Based on these descriptions, the villagers have been able to map out potential nesting areas in their respective communities.

"As part of the eradication strategy, we would train people on the ground to be eyes and ears in keeping an eye on these animals. They also have been taught how to track them, catch them and finally kill them," Ms Thomas said.

Pregnant reptiles killed

By CAROLINE RATUCADRA

Close to ten pregnant American iguanas were killed in Cakaudrove this month in a bid to eradicate the introduced animal.

A female iguana which had 72 eggs was terminated at Tukavesi village this week.

The average number of eggs found in these dissected pregnant female iguanas killed during the eradication exercise were around 56 and 57.

According to NatureFiji-MareqetiViti conservation co-ordinator Nunia Thomas, the smallest female iguana killed had 10 eggs while the largest had 72.

"We have been catching plenty iguanas recently with close to 10 female gravid ones killed. They were done at Vuna Village, Mua Research Station and Tukavesi Village.

Ms Thomas said the majority of the iguanas were caught on Qamea Island where it had been reported to have had many recent sightings.

She said more sightings have been reported and this shows that it is nesting season for the iguanas and they tend to be more mobile during these times.

"This is the time that the female gravid iguanas come out and look for places to nest their eggs.

"That more iguanas have been caught or killed also indicates that we are on the right track in mobilising our men on the ground to look out for these pests," Ms Thomas said.

She said villagers now know how to track, trap and kill these iguanas if they see one.

Ms Thomas said while they expected to catch more female gravid iguanas in the next few months only time would tell.

"We cannot confirm if we will catch more iguanas in the next few months because we are all still learning the life cycle of animal here in Fiji."

"We have researched about their behaviour in other parts of the world but it is hard to say if it will be the same here in Fiji based on the current behaviour we have observed so far."

Ms Thomas urged people on the need to report iguana sightings to authorities so they could keep track of movements.

It is reported that 80 per cent sightings of iguanas are from Qamea Island with approximately 90 per cent of these from the Naivivi Bay area.

A dead American iguana which had seventy two eggs after being dissected at a workshop in Tukavesi Village. Photo: Courtesy of TERIKANO TAKESAU

Fiji's Own Paper

The Fiji Times

TUESDAY, OCTOBER 4, 2011 32 PAGES 90c VIP THE FIRST NEWSPAPER PUBLISHED IN THE WORLD EVERY DAY

RECORD LOSS OVER ARCTIC

OZONE HOLE

PAGE 17

FLYING FIJIANS

DOMONI DEFIANT

PAGE 28

Aliens on the

move

CONCERN State issues strong warning over reptiles

An American male iguana pictured at the Koronivia Research Station in Nausori yesterday.

Picture: [illegible]

By SERAFINA SILAITOGA

AMERICAN iguanas have reportedly been seen on mainland Vanua Levu.

The northern agriculture office yesterday confirmed it had received reports from villagers in Cakaudrove that they had seen similar iguanas as those on Taveuni in their area.

The reports soon prompted the department to appoint village headmen from villages in three districts in Cakaudrove as temporary biosecurity officers to monitor the situation and update the department.

The sighting reports were [illegible] at the Tunuloa district meeting in the first quarter of this year.

Roko Tui Cakaudrove Ro Ana Mataitini said villagers had informed the meeting that the iguana similar to the one in Qamea was seen on the beach side of [illegible] settlement in Tunuloa.

The headmen, now also temporary biosecurity officers, in the villages of Karoko, Yakawou, Korovou, [illegible], [illegible], Loa, Vunikura, Navi, Dakuniba, and Rabi and Kioa islands have started monitoring the situation following the reports.

These villages all on mainland Vanua Levu with Dakuniba Village a 30-minute boat ride away from Taveuni.

There have also been reports that people could be transporting iguanas from Taveuni.

Agriculture permanent secretary Colonel Mason Smith has issued a strong warning against the transportation of these reptiles.

Col. Smith said under the Biosecurity Declaration, a person could face a maximum penalty of $10,000 while companies could be fined up to $200,000 if caught transporting the iguana to other places.

He confirmed that an iguana was also found on Kioa Island in the Lomaiviti Group earlier this year, and had been taken to the Koronivia Research Station.

He said there were possibilities of the reptile swimming such a distance, which they concluded for the one found in Kioa.

"If it can get to Kioa, it can certainly get. Around to [illegible] area but we are closely monitoring things," Col. Smith said.

Last week, a group from NatureFiji-MareqetiViti held workshops in the area teaching villagers how to trap and kill an iguana. Col. Smith stated last week that the reptile had started feeding on the million dollar dalo industry.

Principal Agricultural Officer northern John Cox confirmed they were working closely with the headmen to monitor the situation.

"These men have been given the posts of biosecurity officers because reports have surfaced that villagers are seeing the American iguana around their areas," Mr Cox said.

"I have received the reports myself and that is why we have created the temporary biosecurity posts for the village headmen. It is their duty to monitor and report to the office of NatureFiji every week and to the agriculture office as well whether or not they see an iguana," he said.

■ EDITORIAL COMMENT: Page 8

Officers trac

By CAROLINE RATUCADRA

Fourteen temporary biosecurity officers have been appointed by the Biosecurity Authority of Fiji (BAF) to keep track of American iguanas during this nesting season.

Permanent Secretary for Agriculture Colonel Mason Smith said these appointed officers would work through the nesting period of American iguanas to gather and submit data on sighted, captured and non-captured iguanas.

"They will also be conducting surveys during the nesting periods, mobilising response units to a confirmed nesting site, assisting with euthanasia on capture iguanas and record the necessary data."

It has been established that the American iguanas have populations in Qamea, Buca, Taveuni and Laucala.

While there have been reports of sightings in Taveuni, Colonel Smith said there is no concrete evidence to suggest there is a population breeding on the island.

sundayeditor@fijisun.com.fj

k American iguanas

However, they have trained people on Taveuni to monitor the coastline and river ways for American iguanas.

"BAF is exploring the option of using detection dogs and firearms to track down the American iguanas and help eradicate it," Colonel Smith said.

"Detection dogs would greatly improve the search effort and would be far quicker and effective."

The detection dogs and firearms to be used in the iguana eradication plan that will possibly be adopted by BAF was a recommendation made by experienced iguana biologist, Rick van Veen.

Mr van Veen, who conducted three months of iguana research on Qamea this year, had stated in his recommendation that the island of Taveuni is a priority and that immediate effort is needed to identify and control the pest on the island.

"If they (iguanas) become well established on Taveuni, it's very likely that they will reach Vanua Levu," Mr van Veen said.

"The cost and effort required for such a large problem will probably become financially insurmountable."

Mr van Veen said at this point, the containment of the animal is a priority with a focus on controlling those that are now on Taveuni.

"If dogs and firearms can be obtained then the sooner the better," he said.

"The American iguana population is relatively small but if it remains unchecked, it will likely grow exponentially."

[illegible] taxpayers [illegible] entertained by the Ministry

Now iguanas turn to dalo

By CAROLINE RATUCADRA

American iguanas have become a real threat to vegetation in Taveuni and Qamea islands.

Taveuni's $8 million dalo industry is under threat after reports that iguanas feed on dalo leaves, dalo suckers and even vegetables.

Introduced iguana species have reportedly started feeding on young dalo leaves and suckers on the islands.

This has prompted the Biosecurity Authority of Fiji (BAF) to explore the option of using detection dogs and well trained hunters to track down the introduced iguanas in a bid to eradicate it. Permanent Secretary for Agriculture Colonel Mason Smith said 90 per cent of farmers are from Taveuni.

He said the agriculture industry needed to be protected. Government has budgeted about $200,000 for 2010 and 2011 in the eradication of the iguanas.

Colonel Smith said if the iguanas made the islands their home then the people would suffer in terms of their livelihood and food security. "The American iguana is a pest and a menace. Wherever it establishes itself it becomes a major nuisance especially in farming areas like house, rooms, beaches and also in village gardens and streams."

"If American iguanas establish themselves and continue to feed on dalo here, this could have serious impact on our $30 million dollar dalo industry."

While there have been reports of sightings in Taveuni, Colonel Smith said they had trained people on Taveuni to monitor the situation and close ways for American iguanas.

Government nets $0.5M

• From Page 1

ministry reviewed its home administering and management policy.

Operation Volunteerism was established to see that the directives from the Prime Minister are followed.

In the first five months of the year the ministry collected close to $4m of revenue from duties and taxes.

Mr Kuk said they had collected over $18.5m. He said the elimination of vast outstanding arrears had been boosted with the assignment of police officers in the ministry.

As part of the exercise, their ministerial analysts revealed the need to intensify address some key areas in order to improve their services to farmers and potential investors and importantly to align their work to the People's Charter for Change and Progress.

"The improvements include the ongoing review of our systems and processes, instituting some legislative reforms and reorganising and re-deploying existing human and financial resources," Mr Kuk said. Some of the quick wins, he said, involved certain changes to the ministry's database and revenue management.

"The database is now updated instantly upon receiving payments from the banks. This means that we are now getting 'real-time' information which is absolutely critical for decision-making."

He said the past practice was that the database was updated days and even weeks and months after payments were received from clients. "The process of receiving revenue, updating the database and issuing an electronic receipt to the client takes about two minutes, he said.

The new directive to update the database instantly means that clients will walk away with the confidence that the information about their lease has been updated in the Ministry's database, and the Ministry will now have real-time information about the leases.

"Additionally, this new directive also means that our revenue management will improve as we will be able to account for funds in accordance with Government's revenue management guidelines. We will also be able to better quantify the revenue generated, which should help with Government's budgeting purposes," he said.

Two American iguanas captured on Tawsani are cased at the Koronivia Research Station in Nausori.

HISTORY TODAY

REVOLUTION
Che Guevara is executed, 1967

On this day in 1967, socialist revolutionary and guerilla leader Che Guevara, age 39, is killed by the Bolivian army. The U.S.-military-backed Bolivian forces captured Guevara on October 8 while battling his band of guerillas in Bolivia and assassinated him the following day. His hands were cut off as proof of death and his body was buried in an unmarked grave. In 1997, Guevara's remains were found and sent back to Cuba.

DISASTER
Landslide kills thousands in Italy, 1963

On this day in 1963, a landslide in Italy leads to the deaths of more than 2,000 people when it causes a sudden and massive wave of water to overwhelm a dam. The Diga dei Vajont dam was built in the Vajont Gorge to supply hydroelectric power to Northern Italy. Located 10 miles northeast of Belluno, it rose 875 feet above the Piave River below and was a full 75 feet wide at its base. The construction of the dam created a large reservoir, which held more than 300,000 cubic feet of water.

AUTOMOTIVE
Meteorite crashes into Chevy Malibu, 1992

On this day in 1992, 18-year-old Michelle Knapp is watching television in her parents'

Wretched, useless iguana

By SOTIVA SAMLES

> "The big ones actually look pretty much the same as the small sort of iguana, but scarier because of bigness that lets us see all those pointy bits and the long scratchy toenails and sticky-up scales, not to mention the mad staring eyes"

NEVER mind about the rugby — the women's team who won at the South Pacific Games will uphold our reputation while the guys sort themselves out.

Let's deal with the serious issue of the week — the giant, scary-looking iguana.

The big ones actually look pretty much the same as the small sort of iguana but scarier because of bigness that lets us see all those pointy bits and the long scratchy toenails and sticky-up scales, not to mention the mad, staring eyes.

As for the teeth! Um, well I haven't actually seen the teeth, but they have to be using something to gobble up people's dalo leaves with.

But you know how [illegible] dalo is? I want to know has anyone seen the iguanas go back for a second meal of dalo leaves?

No wonder they have started sneaking into people's kitchens and stealing the cabbage instead.

The cabbage-owners reported that the iguana ate the green part and left the crunchy white stalks.

Maybe it just finds stalks too tough to tackle.

Makes you wonder why people would think these delicate herbivores could suddenly start devouring people — even if they begin with very small children.

But seeing as Fiji's answer to Godzilla is taking the rap for everything from missing leaves to [illegible] what else might these dastardly lizards be up to?

What if they are into eating mangroves? — you know, the precious coastal vegetation that protects our shores in hurricane season and provides a nursery for fish and other marine creatures that populate our bays and provide food for our tables, or used to.

Could they already be in Nausori? I mean, have you noticed all the disappearing mangroves along the waterfront.

Not just Suva. According to a recent study on an area near Nausori, the fish are fast disappearing along with the mangroves and the [illegible] owners can hardly find something big enough to put in the crab traps — not that there are many crabs either.

I've got a suspicion the giant iguana could have been at work in my compound.

Either that or someone using the slash and burn method of gardening has done for a number of formerly treasured plants and fluffed about it.

Because not even the troubled folk of Qamea and Taveuni have reported iguanas eating up entire curry leaf bushes and mango trees.

Now someone has reported finding a fish tail in an iguana stomach, which opens up a whole other area of worry and concern.

If they are in the water, you can bet they are feeding on the reef and we know that is not good for the coral polyps and other creatures.

What if they are biting sharks? What if they are nipping off shark fins?

We know many dying, finless sharks are being found and that they are being pushed towards extinction.

[illegible] reported seeing a [illegible] iguana make a rude sign at a dolphin, but so far no dolphin damage has been reported.

Is it Godzilla that's doing the clear-cut logging in Bua?

Because there has also been a report of a suspiciously iguana-looking character wearing a red cap driving a truck loaded with mahogany.

We know the problems exotic, introduced species can cause.

Considering what it is accused of, the iguana could be giving us a lot of help in that direction.

But do we see it attacking toads? Gobbling mongooses? Munching [illegible]?

Even if it still insists on being a herbivore, we don't see it mowing through the para grass or chewing on water hyacinth.

At worst, the iguana is a herbivorous accident, at best the wretched thing is useless.

Reminds me of my favourite letter to the editor of the week which was, of course, about rugby.

It said "stop praying, start playing".

I thought maybe we could send something similar to the Fiji National Provident Fund people who keep fussing about with figures and wanting to chop pensions, saying something like "stop playing, keep paying".

Now I hear that some people have found the American iguana quite tasty.

Perhaps the slogan for those who suspect it of indiscriminate consumption and turning carnivorous should be "stop bleating, start eating".

Yells when she hears a thunderous crash in the driveway. Alarmed, Knapp ran outside to investigate. She found a sizable hole in the rear end of her car, an orange 1980 Chevy Malibu; a matching hole in the gravel driveway underneath the car; and in the hole, the culprit: what looked like an ordinary, bowling-ball-sized rock. It was extremely heavy for its size. A curator from the American Museum of Natural History confirmed the object was a genuine meteorite.

WAR

St Paul's Cathedral bombed, 1940

During the Battle of Britain, the German Luftwaffe launched a heavy nighttime air raid on London. The dome of St Paul's Cathedral was pierced by a Nazi bomb, leaving the high altar in ruins. It was one of the few occasions that the 17th-century cathedral suffered significant damage during Germany's nearly ceaseless bombing raids on London in the fall of 1940.

HISTORY

Oskar Schindler dies, 1974

German businessman Oskar Schindler, credited with saving 1200 Jews from the Holocaust, dies at the age of 66. A member of the Nazi Party, he ran an enamel-works factory in Krakow during the German occupation of Poland, employing workers from the nearby Jewish ghetto. By the war's end, he was penniless, but he had saved 1,200 lives.

The Fiji Times ONLINE

Iguana bite

Serafina Silaitoga
Tuesday, November 01, 2011

villagers on Taveuni have been warned not to annoy American iguanas following reports that a boy was bitten by one.

The attack on the boy, whose age is not known, prompted a warning by MareqetiViti, Taveuni branch, a non-governmental organisation that works with the Ministry of Agriculture in the eradication of iguana, for people not to annoy it.

The group is heading awareness programs and is working with communities affected by the invasion of these reptiles. MareqetiViti Taveuni officer Waisale Matailoga warned that people should be careful when trying to trap and kill the iguana.

"They are not to annoy it or make it angry because its claws can hurt people and its tail is just as harmful.

"I have received a report from a Naivivi villager we work closely with, that an iguana bit a boy's finger," Mr Matailoga said. "The iguana's teeth are very sharp."

Mr Matailoga said in a workshop at Tamaka district, they put a juvenile iguana and a mongoose in a cage to test the strength of the iguana.

"It didn't take five minutes for the iguana to take down the mongoose as it used its tail to whack the mongoose' eyes causing blindness.

"That showed us how an iguana equips itself well when under attack so people have to be careful when handling it.

"We are asking people not to make the iguana angry because there have been reports that some

villagers, when they see an iguana, they gang up against it and this annoys the iguana."

He said the common response from villagers during awareness workshops had been fear. "A lot of people fear it because it is a new kind of species on our shores and it's physical appearance easily scares people.

"Even when we take the iguanas to the awareness workshops, not many people come forward to hold it because they are scared of it."

He said the plea for people not to annoy the iguana was made known at awareness workshops.

The group has continued to hold workshops in the province of Cakaudrove.

Iguana cruelty

WHAT have the American Iguanas ever done to deserve such appalling treatment from the government authorities and the people of Fiji?

These regal and dignified creatures arrive on our shores, through no fault of their own and they have been tormented and ill-treated ever since.

[illegible] go [illegible] they eat [illegible] leaves and other vegetation to survive.

[illegible] causes a lot more damage than the iguanas, yet I don't see any [illegible] of the authorities [illegible] and tormenting these people.

The boy who got bitten probably aggravated the iguana which felt threatened and defended itself. The iguana doesn't attack without provocation.

That is not in their nature. If left alone they are harmless and shy and children should be told to leave them alone.

Putting a mongoose into a cage with an iguana is monstrous and the height of cruelty.

That poor animal (mongoose) was blinded and took five minutes to die.

Isn't there a law against cruelty to animals in Fiji?

Someone even suggested setting dogs on the iguanas! What is the world coming to, that we can inflict such cruelty on our fellow creatures?

A better suggestion would be for the authorities to catch maybe a dozen or so of the American iguana and drop them off in the interior where there are no people and only vegetation.

I am sure the Kula Bird Park would take a few of these creatures as well.

Let's approach this problem humanely. After all cruelty to animals is a sin in the eyes of God.

[illegible]
Suva

HOW TO CONTACT US

Publisher: Brian O'Flaherty
Editor-in-Chief: [illegible]
Printed by Fiji Times Ltd.
HEAD OFFICE: 177 Victoria Parade, Suva, GPO Box [illegible]

NatureFiji works on iguana eradication

By MAIKA RABALEILEKUTU

NATUREFIJI-MAREQETIVITI has been working on destroying the American iguana now found in Fiji.

Conservation co-ordinator Nunia Thomas said reports of the American iguana had surfaced in 2002 while the search for these iguanas proved unsuccessful.

She said there were two types of species — native and introduced — around the world.

She said introduced species were those threatened at the place where they were from.

Ms Thomas said when those species were brought into another country, they became predators.

She said the American iguana is thought to be a predator to our forests and they were working on eradicating them.

She said several workshops had been organised in villages to inform them of the realities of Fiji forests.

The American iguana is dangerous but not harmful to humans. It can only grow up to two metres long.

Eleven American iguanas were found on Qamea last year while another five were believed to have been found on Koro this year.

"We need support in killing all these American iguanas because they multiply very fast," Ms Thomas said.

She said they were aiming to start the eradication of iguanas in mid-August.

Regional updates

Lilo, McCully talk business

Honiara: New Zealand foreign affairs minister Murray McCully has made an early New Year's visit to the country to re-affirm their government's bilateral relationship with the new leadership of NCRA.

Mr McCully met with Prime Minister Gordon Darcy Lilo and his Cabinet Ministers at the Prime Minister's Office.

Speaking during a ... said Mr McCully's visit demonstrate the New Zealand government's commitment in supporting the National Government on their development plan.

PM Lilo outlined that a lot of issues were discussed including New Zealand's continuous re-affirmed assistance in the country's education, fisheries, infrastructure, tourism and the policing ... *—PACNEWS*

Port Moresby: Grand Chief Sir Michael Somare has been off the payroll since December 12, the day the O'Neill-Namah government re-enforced their regime to be the alleged legitimate authority.


Somare

This is also the day the Supreme Court handed down its decision reinstating Sir Michael as the legitimate prime minister of the country.

Belden Namah, Deputy Prime Minister in the O'Neill-Namah led government repeatedly announced during his recent outbursts to the media that Sir Michael was already put off payroll because he was no longer a Member of Parliament. *—PACNEWS*

World's tiniest frogs found in Papua New Guinea

Port Moresby: With voices hardly louder than an insect's buzz, the tiniest frogs ever discovered are smaller than a coin and hop about the rainforest of the tropical island of Papua New Guinea, US scientists said.


World's tiniest frog

... the smallest frogs known to man, they are also believed to be the smallest vertebrates on Earth, said the report in the science journal PLoS ONE.

The little land frog Paedophryne amauensis ...


A man holds an American iguana at Qamea Island.

2500 iguanas on Taveuni: Biosecurity

By KERESI NAUWAKARAWA

About 2500 American iguanas are living on Taveuni Island and authorities have labeled the reptile as a pest and menace.

This was the estimate given yesterday by the Biosecurity Authority of Fiji (BAF).

Environmental group, Nature Fiji/Mareqeti Viti, highlighted that the American iguanas is a potential risk to endangered and endemic iguanas through the spread of disease.

The American iguanas also poses a threat to human beings.

Reptiles are known vectors of human salmonellosis; American iguana handling has been one of the most common ways in which humans have contracted the disease.

Village gardens are also at risk of intensive foraging by the herbivorous iguanas. BAF chief executive officer Elvis Silvestrini yesterday said the eradication programme was progressing well.

"The American iguana is an invasive pest which mainly feeds on plants (fruits and leaves).

"If the population is left unchecked, food sustainability in villages could be at risk because the iguanas will be competing for the same food (dalo and cassava leaves, bele, pawpaw, cabbage, etc) consumed by us.

"This could affect our food security, 90 per cent of the dalo exports come from Taveuni and if the American iguana establishes itself and continues to feed on the dalo tops this could have serious impact on our $20 million dalo industry.

"The American iguana is a pest and a menace: wherever it established itself it becomes a major nuisance especially in tourist areas such as hotels, resorts and beaches and also in village gardens and kitchens.

"At this point it is impossible to give an accurate estimate of the numbers of American iguanas living in Fiji.

"An educated guess would probably be 2500 living on Qamea, Matagi, Laucala and Taveuni, perhaps 400 adults and the remainder juveniles and hatchlings."

Mr Silvestrini said a three-year strategic plan of action in place but it should be noted that this eradication will take time.

"With this in mind we have strategies in place and this includes awareness and training.

"Capture and kill- villagers have been trained by experts on how to capture and kill American iguanas in a humane manner."

Hefty fine for moving iguanas

By KERESI NAUWAKARAWA

Anyone caught to be moving or transporting the invasive American Iguana will be fined $40,000, the Biosecurity Authority of Fiji (BAF) has warned.

BAF chief executive officer, Elvis Silvestrini warned that the Biosecurity Emergency Declaration on American iguanas is currently in place which prohibits people or any individual to move, transport or carry the American iguana at any stage (eggs, juvenile and adults) from Qamea, Taveuni and Matagi to other parts of Fiji or between these islands.

The warning comes amid reports recently publicised in the media that the American iguana will be on menu of hotels and restaurants in Fiji.

Mr Silvestrini said they would monitor to ensure that there was no movement of transporting American iguana from Qamea, Taveuni and Matagi Islands to other parts of Fiji or between these islands.

Mr Silvestrini said anyone found carrying or breeding the iguanas could be fined $40,000 for an individual and $200,000 for a corporate body.

"People now know the American iguana is a pest. They also know there are heavy penalties for those caught moving the reptile so wanting to eat it should keep this in mind or they could find themselves in trouble."

Executive chef of the Castaway Island, Lance Seeto clarified his involvement in including the invasive pest on the island's menu.

Mr Seeto told BAF officials that he was alarmed to hear his comments taken out of context.

"We were talking about what other countries such as Mexico did with the American iguana in their countries and it seems that the reporter has taken that and run with it," he told BAF.

While acknowledging the reptile is eaten in some Central American countries, Mr Silvestrini said consumption of American Iguana is not encouraged in Fiji.

Iguana warning

By IOANE BURESE

THE Biosecurity Authority of Fiji has reiterated its warning against moving or transporting American iguana from Qamea, Taveuni and Matagi islands to other parts of Fiji or between these islands.

The warning follows a report by *The Fiji Times* that a chef was considering preparing a menu that features the reptile.

However, authority CEO Elvis Silvestrini warned that there was a biosecurity emergency declaration on American iguanas which prohibited people from moving, transporting or carrying the American iguana at any stage (eggs, juvenile and adults) from Qamea, Taveuni and Matagi to other parts of Fiji or between these islands.

Mr Silvestrini said anyone found carrying or travelling the iguanas could be fined $10,000 for an individual and $200,000 for a corporate body adding that people should be aware of the penalties.

"People now know the American Iguana is a pest," he said.

"They also know there are heavy penalties for anyone caught moving the reptile so anyone wanting to eat it should keep this in mind or they could find themselves in trouble."

According to a BAF statement, the executive chef of Castaway Island, Lance Seeto, has also clarified his involvement in including the invasive pest on the resort's menu.

Mr Seeto told BAF although he was alarmed to hear his comments taken out of context.

"We were talking about what other countries such as Mexico did with the American Iguana in their countries and it seems the reporter has taken that and run with it," he told BAF.

While acknowledging the reptile is eaten in some Central American countries, Mr Silvestrini said consumption of American Iguana was not encouraged in Fiji.

"We are a long way from this.

"Countries that have started eating the American Iguana are those which have given up trying to eradicate the pest and are looking at alternative ways to reduce its numbers.

"There are also public health concerns and we don't want to promote American Iguana as a food source in Fiji."

According to Mr Silvestrini, BAF had the support of the tourism industry which recognised the threat invasive pests could pose if not controlled.

"We don't want to get to the stage where iguanas are routinely attacking people and affecting tourism. That is why BAF will embark on a more targeted campaign against the American Iguana this year," he said.

Mr Silvestrini requested the media to report responsibly on biosecurity issues, stating that inaccurate reporting of biosecurity matters may not only have serious consequences for agriculture, the environment, tourism and people's health but could also affect Fiji's multi-million dollar export industry.

"I would like to stress that the biosecurity laws of this country are to protect the health of people in Fiji, our environment, our agricultural industries as well as tourism industry. BAF will come down hard on people found breaching these laws because the potential risks are too great."

The Biosecurity Authority of Fiji warns against the transportation of the American Iguana. Picture: FILE

ANNEX 11

Conservation news

Iguana iguana—a feral population in Fiji

In 2004 stories of introduced Komodo dragons on the island of Qamea started circulating in Fiji. The unidentified giant lizard was soon suspected of being an Asian water monitor, then a marine iguana but a good description was not available until October 2006, followed by a photograph in September 2008. The creature is the green iguana *Iguana iguana*, several orders of magnitude larger than any Fijian lizard.

We now know that a small number of hatchling green iguanas were illegally imported into Fiji in 2000 and later released on Qamea Island by expatriates (Naikatini, A. et al., 2009, *Alien Iguana Survey, Qamea Island, Cakaudrove Province, Fiji*. Unpublished Report to the Department of Environment and the National Trust for Fiji). Breeding populations now occur on Qamea and nearby Matagi island, and some adults have been captured or sighted on nearby Laucala Island (one in 2008), Taveuni Island (two in 2010 and one in April 2011) and distant Koro Island (one in February 2011).

On the 34 km^2 Qamea island most green iguana sightings have been along c. 2 km of coastline either side of the original release site in Naiviivi Bay. This coastal strip has a scattering of inhabited areas separated by patches of secondary forest, vegetable gardens and fringing mangroves, with uninhabited, primary rainforest inland. The 94 ha Matagi island has one tourist resort and few other inhabitants, and is mostly forested. No population estimates are currently available but dozens of adult green iguanas and hundreds of juveniles/subadults could potentially be living undetected in the coastal forests of these two islands.

Juveniles and subadult green iguanas are sighted in these areas in most months of the year. In August–September 2010 four gravid female green iguanas were captured and killed as they searched for potential nesting sites in open, inhabited areas: three on Qamea and one on Matagi Island. As both of these islands are forested, females need to locate open, sunny sites to nest (Bock et al, 1985, Seasonal migration and nesting site fidelity in the green iguana. In *Migration: Mechanisms and Adaptive Significance,* ed. M.A. Rankin, University of Texas Marine Sciences Institute) and such sites mostly occur in inhabited coastal areas.

The potential impacts of a large feral population of the green iguana in Fiji are many and unpredictable but economic loss and food security threats, including damage to commercial and village vegetable crops, negative impacts on native forests, competition with, and possible disease/parasite transfer to, the native Endangered Fijian banded iguana *Brachylophus bulabula*, fouling of village and resort areas, and even plane strike risks, have all been suggested (Kraus, F., 2009, *Alien Reptiles and Amphibians. A Scientific Compendium and Analysis,* Springer). The taro export industry from nearby Taveuni Island is worth FJD 8 million annually to the Fijian economy alone.

The Fiji Department of Biosecurity Services was quick to appreciate the possible impact of this foreign pest species and in March 2010 introduced legislation making it illegal and punishable by large fines and prison sentences to transport green iguanas between the islands of Qamea, Matagi, Laucala and Taveuni. A public awareness campaign in June–July 2010 took place in every community and village in the areas on the islands where iguanas have been seen. An eradication plan funded by the Fiji Ministry of Primary Industries (Harlow, P.S. & Thomas, N., 2010, *American Iguana Eradication Project: Herpetologists' Final Report*. Unpublished Report to the American Iguana Eradication Campaign Task Force and NatureFiji–MareqetiViti, Fiji.) has commenced.

Community involvement will be the key to successful eradication of this iguana from Fiji. More than 2,000 people live in the iguana-affected areas on Qamea and Matagi Islands, and many travel regularly around the coastal fringes to work in their vegetable gardens. Reporting of iguana sightings to local coordinators who can respond quickly, catch and kill iguanas is the simplest, most effective solution. A range of detection and capture methods will be implemented, including traps, snares, camera traps and telemetry of neutered adult males during the mating season.

Kraus (op. cit.) summarized available information on 21 cases of invasion by green iguanas around the world. The species has successfully invaded 12 Caribbean islands, with eradication attempts either unsuccessful or not attempted in all of these cases. Feral populations have also become established on Hawaii, the Canary Islands and in Florida. Several incursions into continental USA have been eradicated but Kraus (op. cit.) notes that in general 47% of reptile and amphibian introductions to islands of less than 6,000 km^2 are successful whereas only 12% of such introductions to continents are successful. The total eradication of this species from Fiji will be difficult but, if successful, the high but short-term cost will greatly outweigh the perpetual costs of mitigating damage by a large, feral population of green iguanas.

We thank the Critical Ecosystems Partnership Fund for initial emergency funding, the Fiji Ministry of Primary Industries, Fiji Department of Environment, Cakaudrove Provincial Office, Dr Dick Watling, the villages of Naiviivi

and Togo, Theodore Blossom, Dr Robert Johnson and the late Mr Ilaitia Boa.

Nunia Thomas, Kelera Macedru & Waisale Mataitoga NatureFiji–MareqetiViti, Suva, Fiji Islands. E-mail nuniat@naturefiji.org

Jerry Surumi, P.A. Naiviivi, Taveuni, Qamea Island, Fiji Islands

Sipiriano Qeteqete and Jone Niukula, National Trust of Fiji, Suva, Fiji Islands

Alivereti Naikatini South Pacific Regional Herbarium, Institute of Applied Sciences, University of the South Pacific, Suva, Fiji Islands

Alice Heffernan Matagi Island Private Resort, Matagi Island, Fiji Islands

Robert Fisher United States Geological Survey, San Diego Field Station, San Diego, California, USA

Peter Harlow Taronga Conservation Society Australia, Mosman, New South Wales, Australia

Twelfth Student Conference on Conservation Science

The 12th Student Conference on Conservation Science (SCCS) in Cambridge was held on 22–24 March 2011 in the Department of Zoology, University of Cambridge, and attended by over 180 student delegates from more than 60 countries. The Vice-Chancellor of the University, Professor Sir Leszek Borysiewicz, gave an encouraging introductory address in which he emphasized the multidisciplinary nature of conservation and the diversity of the individuals involved with the protection of the environment.

Learning opportunities abounded throughout the conference and were provided through a varied and stimulating programme of plenary lectures, student presentations, poster sessions, workshops, and networking and social events. Professor Jeremy Jackson's (Scripps Institution of Oceanography, USA) opening plenary entitled 'Conservation at the crossroads: what could the oceans be like by 2025?' was hard-hitting, bleak and thought-provoking in equal measures. Conference participants were left in no doubt that if we are to avoid an ocean apocalypse, urgent and immediate action is required to tackle human impacts on the oceans such as overfishing, pollution and climate change. Professor Jackson asserted that one of the most important and pressing scientific challenges in conservation today is how to make aquaculture ecologically sustainable. Over the duration of the conference further plenary lectures were given by leading conservation researchers, Professor Wolfgang Cramer (Postdam Institute Climate Impact Research, Germany), Professor E.J. Milner-Gulland (Imperial College, UK) and Professor Kerry Turner (University of East Anglia, UK).

As an international conference, aimed entirely at young conservationists, key features of the SCCS series are the student presentations, poster sessions and workshops. Grouped thematically, the student talks were interspersed with a selection of practical 90-minute workshops offered by senior research scientists and conservation practitioners. In all there were 31 student talks on a diverse range of topics, and prizes were awarded for three presentations: REDD and the indigenous question: a case study from Ecaudor; Tibetan sacred sites and conservation; and Blackbuck social behaviour influences dispersal of an invasive plant. Students were invited to submit posters based on their participation in conservation research and over 100 were displayed. Social and networking events, such as the Who's Who in Conservation? provided conservation students not only with an opportunity to consume large quantities of pizza but also to meet with staff or representatives from conservation agencies, institutes and NGOs.

The next SCCS conference in the Cambridge series will be on 20–22 March 2012 and a detailed report on the 2011 conference may be found at http://www.sccs-cam.org/previous/overview.htm. Two new meetings in the SCCS series were held for the first time in 2010, in Bangalore, India (http://www.sccs-bng.org/) and New York, USA (http://symposia.cbc.amnh.org/sccsny), and further meetings in these two series are planned for September 2011 and October 2011, respectively.

Nikki Burton Fauna & Flora International, Jupiter House, Station Road, Cambridge, CB1 2JD, UK
E-mail nikki.burton@fauna-flora.org

Conservation Leadership Programme announces 2011 awards

The Conservation Leadership Programme (CLP) has announced this year's 30 award-winning projects in 19 different countries, worth a total of USD 492,000. For many awardees this is the first time they have received funding to manage their own conservation projects. This year, for the first time, the Programme will be supporting researchers in Belize, Iraq and Macedonia. The awards also include Follow-up and Leadership prizes for previous winners whose projects have already achieved success. For example, one group of researchers working on two highly threatened and poorly known amphibian species in China have successfully raised awareness on these species amongst the global scientific community and Chinese public. Another project aims to reduce the supply and consumption of pangolins and turtles in restaurants in Guangzhou—a Chinese city that has a long history of wildlife consumption. The award winners do not just receive financial

support. All award-winning team members become part of the CLP alumni network, which supports c. 3,500 conservation leaders. This network helps awardees implement conservation projects and carry out research in often challenging and isolated environments. Alumni members also receive access to additional grants, mentoring from CLP staff and training. A representative from each award-winning team recently took part in CLP's International Training Course in June 2011 at a remote ecological research station in the foothills of the Canadian Rockies.

The CLP has supported over 530 projects since the programme's inception in 1985. The Programme is a partnership between Fauna & Flora International, BirdLife International, Conservation International and the Wildlife Conservation Society. Visit the awards page on the CLP website (http://www.conservationleadershipprogramme.org/) for more information and see p. 460 for the call for applications for the 2012 awards.

Stuart Paterson Fauna & Flora International, Jupiter House, Station Road, Cambridge, CB1 2JD, UK
E-mail stuart.paterson@fauna-flora.org

18th annual Whitley Awards

The 18th annual Whitley Awards Ceremony was held on 11 May at the Royal Geographical Society in London. The flagship event of UK based charity the Whitley Fund for Nature was hosted by writer and broadcaster John McCarthy, and saw seven conservation leaders from seven countries receive Whitley Awards worth GBP 30,000 each in project funding over 1 year in support of their work. Over 400 people attended the event where the charity's patron, HRH The Princess Royal, presented the Awards. Rachel Graham of Belize won the evening's Whitley Gold Award—worth an additional GBP 30,000 and a second year of funding—in recognition of her success in conserving the sharks and rays of Belize that are crucial to maintaining the healthy marine ecosystems that sustain the country's tourism and fisheries industries. The other 2011 Whitley Award Winners are: Ramana Athreya, India (Community-led landscape conservation in Arunachal Pradesh); Jana Bedek, Croatia (Preserving the subterranean karst habitats of the Dinaric Arc); Elena Bykova, Uzbekistan (Conservation of the Critically Endangered saiga antelope); Hotlin Ompusunggu, Indonesia (Reducing deforestation of Borneo's Ganung Palung National Park through improved community healthcare); and Luis Rivera, Argentina (Threatened parrots as flagships for conservation of the Southern Yungas). For more information on the Whitley Fund for Nature, the Whitley Awards and to view short films about each of the winning projects, see http://www.whitleyaward.org/

David Wallis Whitley Fund for Nature, London, UK
E-mail david@whitleyaward.org

L

SUMMARY REPORTS

[ANNEX 12]

AWARENESS PROGRAMME

- The American iguana was introduced to Qamea Island in the year 2000.
- The 2009 survey by the University of the South Pacific recommended that awareness program to be undertaken for the control and eradication of the American iguana.
- With the assistance of the Provincial Office, Police Department and the Ministry of Agriculture, the first awareness workshop was held at Naiviivi Village, Qamea in July 2010.
- Ever since, 15 awareness workshops have been held in all the villages and settlements and schools in Qamea Island, Laucala and Matangi Is Resort.
- Sightings of the American iguana on the main Island of Taveuni has prompted awareness program to be undertaken within the 3 tikina I Taveuni (Wainikeli, Cakaudrove and Vuna).
- All the other areas within the Biosecurity zones were also included in the programme. (Cakaudrove-i-wai: Fawn Harbour, Viani Bay, Nawi, Ucunivatu and Vunikura: Tikina Tunuloa, part of Natewa tikina i.e Buca and Tukavesi, Rabi and Kioa Island).
- The major aims of the awareness campaign were to:
  - Inform the communities on the Biosecurity Promulgation in place to control the spread of the introduced American iguana.
  - Provide a brief background about the American iguana and its effect on the environment
  - Teaching the basic skills in identifying and knowing the differences between the American iguana and the endemic Viti Banded Iguana.
- Approximately about 40 presentations were made during the entire program covering over 5000 people at village and settlements, schools and resorts.
- A major outcome of the program was the setting up of the billboards by all the concerned government departments and NGOS on all the ports of entries within the island.
- Distribution of the printed charts and pamphlets to workshop participants.
- Rick van Veen spent 3 months on Qamea Island researching on the ecology of the American iguana and the extent of damage done on the native fauna and flora. One of his major recommendations was to contain the American iguana on Qamea Island.
- An eradication procedure for the reptile was determined through this awareness programme.

NAI TUKUTUKU NI VEITUBERI TAUCOKO BALETA NA VOKAI VULAGI NI MERIKA

- Ea yaco taumada mai kin a yanuyanu ko Qamea na vokai vulagi ni Amerika oqo (American iguana) ena yabaki 2000.
- Na nodratou vakadidike na Univesiti ni Ceva ni Pasifika(USP) ena yabaki 2009 ea vakatututaki kina na bibi ni kena qaravi na veituberi ni vakawabokotaki vakatotolo na vokai ni Amerika oqo.
- Nai matai ni veituberi vaka oqo e a qaravi taumada ena koro ko Naiviivi, Qamea ena Julai ni yabaki 2010. Ea rawa vakavinaka na veituberi oqo ena nodratou veitokoni na vale ni volavola ni yasana, Tabacakacaka ni Ovisa kei na Tabacakacaka ni teitei.
- E 15 taucoko na veituberi s qaravi rawa ena veikorokoro, vei tikotiko lalai, na vei koronivuli kei na vei bure ni vulagi e Qamea, Laucala kei Matagi.
- Na kena laurai na vokai vulagi oqo ena yanuyanu ko Taveuni, ea vakavuna ka vakusakusataka na kena qaravi na veituberi ena tikina e tolu – Wainikeli, Cakaudrove kei Vuna.
- Era a qaravi talega na veikorokoro taucoko sara ka rawa ni na dewava yani na vokai oqo. E okati kina ko Cakaudrove e vanua, Fawn Harbour,Viani Bay, Nawi Loa, Ucunivatu kei Vunikura. Tikina ko Tunuloa, Buca kei Tukavesi ena tikina ko Natewa.
- Nai naki bibi ni kena vakayacori na veituberi oqo: -
  - Na kena vakadewataki vei ira na lewe ni vanua na lawa ka vauca na kena vakatabui na veikauyaki se vakatetei ni vokai vulagi ni Amerika.
  - Na nodra tuberi ena veika e kilai me baleta na vokai oqo kei na veika e rawa ni vakayacora ena noda veikau, matasawa kei na veika vakawavoliti keda.
  - Na nodra tuberi na lewenivanua me ra kila na kedrau duidui na vokai ni vulagi Amerika kei na vokai I taukei ni Viti.
- E rauta ni 40 taucoko na veituberi esa qaravi rawa ena nodra sikovi na vei korokoro, tikotiko vagalala, vei koronivuli kei na vei bure ni vulagi. E rauta ni 5000 na lewe vanua era sa rogoca na kena I tukutuku se raica saran a vokai vulagi ni Amerika oqo. (American iguana)
- E dua nai kalawa levu ni kena vakatetei nai tukutuku oqo e sa rawati ena kedra vakaduri cake na 'billboards' ena veikelekele kece sara ni waqa klei na waqavuka e Taveuni. E rawati oqo ena nodra veitokoni na vei tabacakacaka vakamatanitu kei na veisoqosoqo ena taudaku ni matnitu (NGO's) ka ra kauwai tiko ena ulutaga oqo.
- Na kena veisoliyaki nai vola tabaki tikidua (pamphlets) kei na I yaloyalo tabaki (charts) vei ira kece sara era vakaitavi ena vuli.
- Na macala kei na bibi ni vakadidike nei Mr. Rick van Veen ena nona a mai vula 3 toka e Qamea. E laurai ni rawa ni na vakacacana vakalevu na vunikau tubu vakawavoliti kedana vokai oqo. Ea mani vakatututaka me valuti me vakawabokotaki ka me kakua ni tete se dewa tani ena taudaku kei Qamea, Laucal kei Matagi.
- Ea navuci mai na veituberi taumada oqo na kena gadrevi me ra toso tale na veiqaravi ni nodra na vakawabokotaki na manumanu oqo. (Eradication Program)

ERADICATION PROGRAM SUMMARY

- Fifty five (55) participants attended the first eradication workshop and field training from the 23rd – 24th May, 2011 in Naiviivi Village, Qamea.
- To date 5 eradication workshop has already been undertaken. Two workshops in Qamea, 3rd one in Vuna and the 4th and 5th workshops were held in Buca and Ucunivatu respectively. The 3rd workshop which was held in Vuna included all the Turaga ni Koro and three villagers from all the villages in Taveuni.
- Topics covered during the workshop were:
  - Nesting Beach Monitoring
  - Training of volunteers
  - Killing of the American iguana.
- In each workshop the Turaga ni Koro were entrusted with leaders, heading teams of volunteers in the various villages that will be practically doing all the monitoring and killing the captured iguana.
- 14 representatives from each village present during the 1st workshop were identified to participate in the nesting beach monitoring in their respective areas. Field guides were issued to these volunteers. The guides contain the American iguana captured log book, Nesting Beach Log Book and the methods of killing a captured iguana.
- The peak activity months are from May to September.
- This program will continue to cover all the Biosecurity zones.

NAI TUKUTUKU NI VEITUBERI ME BALETA NA VAKAWABOKOTAKI NI VOKA NI AMERIKA

- Nai matai ni veituberi ni kedra vakamatei na vokai e a vakayacori mai Naiviivi enai 23rd-24th May, 2011 ka ra a tiko kina e lewe 55 na lewenivanua.
- Me yacova mai ni kua ea sa vakayacori oti e lima(5) na veituberi ni kedra vakamatei na vokai. E 2 na veituberi e a vakayacori e Naiviivi me baleti ira e Qamea kei na veikorokoro vakawavolita. O ira e Taveuni ea vakayacori ena koro o Vuna ka ra tiko taucoko kina na vei turaga ni koro tekivu mai Lavena ka yaco sara ki Navakawau. Era a tomani ira mai na turaga ni koro e lewe ya tolu mai na dua na koro. Na I ka va ni veituberi e vakayacori mai Tukavesi ka ra mai tiko kina na veikorokoro ena baravi e Buca Bay ka cava sara yani ki Karoko okati talega kina o Rabi kei Kioa. Nai ka lima ni veituberi e a tarai kina na baravi vaka Fawn Harbour (Vunisavisavi) Nawi kei Viani Bay (Ucunivatu Dist Sch).
- Na veituberi e golevi kina:
  - Na nodra yadrava na nodra veimatasawa ena vanua e rawa ni ra vakalutu yaloka kina na manumanu oqo.
  - Nodra tuberi enai vola dusidusi vakarautaki ka vakatabakidua me baleta na manumanu na vokai ni Amerika.
  - Na gaunisala e muri me ra vakamatei kina na vokai e rui ka bibi toka ka me muri na gaunisala uasivi duadua me muri ina na lawa ni vanua.
- Ena veituberi kece era a kerei kina na vei turaga ni koro me ra liutaka na yadrayadravi ena nodra dui yalava ka me ra qai dau vakauta mai nai tukutuku kece era vakasokumuna rawa ka me na qai vakarai toka vakamalua ni sa toso tiko na gauna.
- Esa soli na kaukauwa vakalawa wei ira na turaga ni koro e Qamea kei na mua I Taveuni e cake me na vukea na nodra I tavi era vakanuinuitaki kina.
- E satosoi tikoga na veituberi oqo ka rau sana semati vata tikoga nai matai sa I koya (Awareness & Eradication) me vukea na kena vakatotolotaki yani kina veitiki Cakaudrove tale eso kei na veivanua e nanumi me vakayacori kina.

CEPF Small Grant Final Project Completion Report
Emergency Response to Introduced Green Iguanas in Fiji

Organization Legal Name

Fiji Nature Conservation Trust

Project Title

Emergency Response to Introduced Green Iguanas in Fiji

Date of Report

15 February 2012

Report Author and Contact Information

Nunia Thomas
nuniat@naturefiji.org

CEPF Region

Polynesia-Micronesia Hotspot

Strategic Direction 1

To prevent, control and eradicate invasive species in key biodiversity areas,
In particular: 1.2. 'Control or eradicate invasive species in key biodiversity areas, particularly where they threaten native species with extinction.

Grant Amount

USD $19, 994

Project Dates

1 July 2010 to 30 June 2011. An extension was granted to 31st December 2011.

Implementation Partners for this Project

Please explain the level of involvement for each partner

This project was able to effectively engage a wide array of stakeholders in government, non-government, conservation and non-conservation and local communities.

The Fiji Department of Environment and the University of the South Pacific initiated the response survey to the iguana incursion. This action was followed by the set up of the multi-stakeholder American iguana (Green iguana, *Iguana iguana*) Eradication Campaign Task Force which was initially spearheaded by the Fiji Department of Agriculture. Towards the end of 2010 and in early 2011, the Biosecurity Authority of Fiji was chairing the task force meetings and campaigns.

NatureFiji-MareqetiViti had the role of being the technical adviser and implementer of actions identified for the project.

We were able to secure expert herpetologists (from Taronga Zoo, Australia) to voluntarily conduct scientific surveys to develop the eradication plan.

Tabled below are the stakeholders and their level of involvement in the project.

Table 1: Table of project stakeholders and their level of involvement in the green iguana emergency response project

	Level of involvement in project			
Project Partner	**Member of American iguana Eradication Task Force**	**Technical advice/ research**	**Funding**	**Personnel/ Awareness campaign**
Fiji Department of Environment	x			
Fiji Department of Agriculture	x	x	x	
Fiji Department of Forests	x			
Secretariat of the Pacific Community	x	x		
Biosecurity Authority of Fiji	x		x	x
National Trust of Fiji		x		x
Cakaudrove Provincial Office				x
Fiji Police Force				x
Pacific Invasives Initiative		x		
University of the South Pacific (Institute of Applied Sciences)		x		
Taronga Conservation Society Australia		x	x	

Conservation Impacts

Please explain/describe how your project has contributed to the implementation of the CEPF ecosystem profile

CEPF Strategic Direction	CEPF Investment Priority
1. 'To prevent, control and eradicate invasive species in key biodiversity areas'	**1.2. 'Control or eradicate invasive species in key biodiversity areas, particularly where they threaten native species with extinction.'**

An endangered species in its native range of Central and South America, the green iguana *Iguana iguana* has become a pest in as many as thirty countries outside of its native range. Its invasiveness and associated problems is a surprisingly new concept – simply because it was not monitored - but it is becoming increasingly apparent that green iguanas pose a serious threat to biodiversity and the economic well-being of nations into which it has been introduced.

In Puerto Rico for example, the green iguana was introduced through the pet trade in the 1970s; they now have a population of 4 million (exceeding the human population) and the species is an airstrike hazard at the international airport where personnel have removed up to 1798 iguanas per year and annually costing $80,000 for aborted landings because of their presence on the runway.

In its introduced range, green iguanas can reach densities of up to 223 individuals per hectare which is higher than the densities in its native range; have serious negative impact on local crops and infrastructure (Lopez-Torrez et al. 2011). The general consensus (Savidge 1987; Day and Thorpe 1996; Mermin et al. 1997) is that introduced reptiles, particularly human mediated introductions have caused native fauna extinctions, hybridization with native species and increased incidence of salmonellosis in human populations (Lopez-Torres et al 2011).

The aims of this project were to:

i) contain the green iguana in its current range in Fiji (to the islands of Qamea, Laucala and Matagi); and

ii) conduct awareness campaigns to inform the general public about the presence of this iguana in Fiji and the threats they pose and in the process,

iii) produce and implement a well-informed, widely consulted and feasible eradication plan and program.

Please summarize the overall results/impact of your project against the expected results detailed in the approved proposal

The overall project design had 2 stages:

Stage 1: (funding being reported here) – to dramatically increase the level of awareness of the green iguana; collect information; train staff and pilot eradication methods.

Stage 2 (funding to be sought) will complete the eradication.

A very key and important result of this project is that through this CEPF grant, NFMV was able to leverage more funding from the Ministry of Primary Industries and the Biosecurity Authority of Fiji to begin activities for stage 2 of the project. Overall, the project leveraged FJD 96, 482 – a sum which would not have been possible had we not had this CEPF grant.

Listed below are the expected outcomes for stage 1; and the actual outcomes. Incorporated in here are the results of activities funded by the Fiji government. The financial report will clearly highlight that without the CEPF grant, the project would not have been as widely conducted as it has been so far. Similarly, the funds secured from government were critical to the full implementation of the project.

Technical reports relating to these outcomes are attached in Annexes 2 to 9.

PUBLIC AWARENESS OUTREACH PROGRAMME

All communities in northern Taveuni, Laucala, Rabe, Kioa and Vanua Levu (Natewa-Buca Bay), are fully aware of the green iguana and the dangers it poses; the implications of the declaration of a Biosecurity Area; and, understand the risks in moving Green Iguanas between islands.

ACTUAL OUTCOME:

The awareness campaigns were conducted in 41 villages, 6 schools and one settlement. Above and beyond this, NFMV published newspaper articles (Annex 10), presented at Provincial council meetings, district level meetings and created awareness amongst government and non-government stakeholders on the seriousness of the incursion (Annexes 1–9). The project was strongly supported by the Ministry of Primary Industries and gained nationwide attention.

TRAINING

Island Coordinators are fully trained to enable the full extent of Green Iguana infestation to be determined; that they can react quickly and with confidence to new reports; and are able to pilot eradication methods.

ACTUAL OUTCOME:

Six series of training for nesting beach monitoring, iguana handling and euthanasia were conducted;

One hundred and eight individuals underwent training to be confident enough to implement the nesting beach monitoring and euthanasia;

Fourteen community-based Temporary Biosecurity Officers were confirmed by the Biosecurity Authority of Fiji in October 2011.

See Annexes 2, 6, 8 and 9.

PILOTING ERADICATION METHODS

Worldwide experience with eradicating Iguanas will be reviewed and appropriate methods trialed in Fiji.

ACTUAL OUTCOME:

Four experts were engaged for this aspect of the project; and a network of world experts in iguana eradication methods was established (through the Pacific Invasive Species Initiative). These experts informed the development of the Eradication Strategy document (Annex 4).

One full month of scientific observations (Blossom 2010, Annex 3) and 3 months of trialing methods and building local capacity to implement these methods was conducted (Van Veen 2011, Annex 7).

One scientific publication in the Conservation News section of Oryx 45(3), 321-323. See Annex 11.

Please provide the following information where relevant

- *Hectares Protected*: N/A
- *Species Conserved*: N/A
- *Corridors Created*: N/A

Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives

1.0 Green iguana ecology in Fiji

We were able to gather scientific data to support the eradication strategy document (Annex 7) and gauge a better understanding of the ecology of the American iguanas in Fiji. Data from the community awareness campaigns were added to produce a calendar of iguana activity helping us understand some aspects of their ecology here in Fiji.

This data is now comparable to global case studies. We have been able to ascertain the following:

The iguanas are most visible during their breeding and nesting season (beginning as early as April and through to October);

Hatchlings were observed in late December to early February;

Nesting areas were confirmed in four sites (Qamea and Matagi Island); and fifty other possible nesting sites identified for further intensive monitoring and action.

2.0 Green iguana eradication

In terms of locating and capturing iguanas, the studies conducted through the project confirmed that the most effective method of eradicating the iguanas are to wait till their breeding and nesting season (when they are most visible). Through this knowledge we were able to capture 26 individuals. Of the twenty six, 12 were captured by local community members who had been trained in nesting beach monitoring and iguana capture. More than four hundred and sixty-five eggs were destroyed; and all captured females were killed. This data confirms that local communities can participate in the eradication programme if provided with the training and equipment to implement the eradication. See Annex 7.

3.0 Community involvement

The project has confirmed that while communities can monitor the nesting areas for iguana activity it needs a more efficient method to confirm iguana nests. Further consultation with the network of experts has indicated that the project needs to invest in wildlife detector dogs for this aspect of the eradication plan; and thereby eliminate the iguana eggs to control and minimize the population growth. The exponential growth of the green iguana population, has serious implications for the eradication efforts and the risk of the spread of the iguana to other parts of Fiji.

The project has confirmed that the green iguanas are breeding on two islands: Qamea and Matagi. They are probably also breeding on Laucala but because of the access restrictions this was not confirmed. There have been no confirmed breeding populations on Taveuni – Fiji's biodiversity hotspot; and all actions identified the need to ensure that breeding populations do not establish breeding populations on Taveuni. The iguanas can swim long distances. Boat operators traveling between Qamea and other islands have witnessed and captured iguanas swimming between islands

The immediate actions identified here is to strengthen biosecurity monitoring at ideal incursion sites on Taveuni, monitor potential nesting sites and strategically remove female iguanas. See Annex 7.

We have identified one individual from the community to continue the technical aspect of the eradication programme – Isikeli Pita – who was an understudy to Rick Van Veen on his three months research on Qamea Island.

4.0 Finances

The project was successfully able to leverage FJD 96, 482 from the Fiji government to achieve the objectives of raising awareness and implement the eradication strategy document.

The funds leveraged from government were however post implementation of specific activities; and government was invoiced upon completion of the activities.

In the long term, this is not a feasible way to administer the project and was only possible in this circumstance because we had the CEPF grant in place.

In the absence of the CEPF grant, this manner of implementing projects is financially risky and we have made an administrative decision to not continue this. Therein lies the challenge, because since the cessation of the CEPF grant, we have not been able to continue awareness campaigns and monitoring and eradication on the ground as government has not been able to secure funds to continue the project; allowing for the risk of the project to be discontinued and for the American iguana to spread to other parts of Fiji.

The immediate practical actions that need to be funded to prevent the spread of the iguanas are:

- Contain the iguana population to Qamea, Matagi and Laucala by strengthening the biosecurity protocol on Taveuni and neighbouring islands;
- Increased awareness campaigns and strengthened biosecurity for boat and ferry operators to their crew and passengers; and
- Develop incursion response plan for non-infested islands, ferries and boats;
- Train wildlife detector dogs to periodically sniff out Green iguanas at points of incursion and potential nesting sites on Taveuni and high risk non-infested islands.
- In the long term, financing is needed for:
- Eradication of the iguanas from Qamea, Matagi and Laucala. This will need a good scientific methodology and community participation. The immediate actions have been identified in the Eradication strategy document.

Were there any unexpected impacts (positive or negative)?

The expectations for this project were immense – it assumed that there would be community and government support for the project – and it had been successful in this. The eradication issue raised some animal ethics issues, but this was expected and all methods used were to a global standard for animal ethics as mentioned in the Eradication strategy document.

The greatest challenge will be keeping the eradication issue alive. In the project we learnt that Puerto Rico did not begin to see the impacts of the iguanas until some 30 years after the first incursion. This iguana has only been in Fiji for a decade now, and the lack of visual impact on non-infested islands at this point in time is a challenge in gathering community support. The Eradication document addresses this through continued awareness campaigns.

Lessons Learned

Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider lessons that would inform projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community.

Project Design Process: (aspects of the project design that contributed to its success/ shortcomings)

The project design was a good design:

1. **Public Awareness Outreach Programme.** Without this component of the project, this issue would not have gathered the support it has from the local communities and Provincial office. The manner in which it was delivered: getting their input into the eradication strategy will undoubtedly ensure community and stakeholder support.
2. **Training**. This component of training local communities in monitoring and euthanasia was an eye-opener; and a good strategy to build local community capacity.
3. **Piloting eradication methods**. This component is an important one to test the cost-effectiveness of eradication methods. The research for this component helped establish the network of experts identified for the project.

Project Implementation: (aspects of the project execution that contributed to its success/ shortcomings)

There are several aspects of the project execution that were important for its implementation:

1. **Establishing a steering committee.** Whilst there was a steering committee in place through the American Iguana Eradication Campaign task force, the project implementation was still largely led by NatureFiji-MareqetiViti – a non-government organization rather than by a government body. This meant that the communities and other stakeholders identified NatureFiji-MareqetiViti as the lead organization for an important issue that needed government leadership. We tried to remedy this having all media released through the Biosecurity Authority of Fiji; and it seems to have worked for other communities not involved in the project. From this project we have learnt that we needed to help the Biosecurity Authority of Fiji by building their staff capacity in biodiversity related invasive species. This has been identified as a key follow-up action for invasive species work in Fiji. Having the steering committee in place and commenting on the progress reports helped NatureFiji-MareqetiViti secure the additional funds to implement the project.
2. **Local counterparts**. Having local counterparts to lead the project on Qamea and Taveuni were imperative. In this project our local counterparts were the village headmen of Naiviivi Village (Jerry Surumi) and Togo Village (Inoke Koli), who were exceptional individuals who led the teams on the ground. We also saw that working with the local village headmen was very efficient when we had the support of the Provincial office; so keeping the Provincial office updated through reports and by also helping the village headman articulate his report was very helpful. Another very important stakeholder was the National Trust of Fiji who already had established networks on the island. Engaging their local project officer, Sipiriano Qeteqete and his network helped greatly in the outreach programme and in establishing local community ownership of the issue.

3. **Scientific/ Technical Advisory Group.** There was no formal TAG established, but certain individuals were consulted throughout the project to ensure scientific integrity. Having good science from the very beginning of the project greatly helped in communicating the issue and eradication methods to the non-science and non-conservation communities. We knew that the follow-up data collection would be done by local communities, so teaching them foremost of some basic science ethics and methods were very helpful – the data sheets sent in have been filled out appropriately with minimal invalid data. Experts were engaged and lived amongst the communities during the project time. The presence of these individuals and their engagement of local communities to participate in the research greatly helped in the communities' understanding of the project objectives.
4. **Community consultations.** The community consultations towards the eradication strategy were very important. There is no doubt of community support and capacity to participate in the eradication plan. The only issue that needs to be addressed now is the funding to implement the strategy and further research.

Other lessons learned relevant to conservation community:

See above.

Additional Funding

Provide details of any additional donors who supported this project and any funding secured for the project as a result of the CEPF grant or success of the project.

Donor	Type of funding*	Amount	Notes
Fiji Government	B	FJD 96, 482	The government funding support only after NFMV was able to prove through this CEPF grant that there needed to be an emergency response to the green iguana incursion and that there was strong community support for it.
European Union (through BirdLife International Pacific Secretariat)	C		NatureFiji-MareqetiViti was able to secure funds to do the Fiji component of the regional BirdLife Invasive Species Programme. The project implementation period is from 2012 to 2015. NFMV will be leading the components on developing an incursion response plan on Taveuni for the mongoose and the green iguana; continuing the awareness campaigns with local communities and general public; working the Biosecurity Authority of Fiji on strengthening inter-island biosecurity protocol.

** Additional funding should be reported using the following categories:*

A Project co-financing (Other donors contribute to the direct costs of this CEPF project)

B Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF project.)

C Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)

Sustainability/Replicability

Summarize the success or challenge in achieving planned sustainability or replicability of project components or results.

The design of the public outreach and the eradication strategy or the science behind the strategy are replicable. The methods are outlined in the technical reports and the Eradication strategy documents attached.

We were able to secure funds to develop the incursion response plan, and further awareness campaigns from external sources (BirdLife International's European Union Regional Grant); and had been discussing with government on funds for the eradication component but to date we have not been able to secure any further funds from government. We will have to seek for external sources of funding whilst assisting government develop their capacity to manage this type of incursion and projects.

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our website, www.cepf.net*, and publicized in our newsletter and other communications.*

Full contact details:

Name: Nunia Thomas

Organization name: NatureFiji-MareqetiViti

Mailing address: P.O Box 2041, Government Buildings, Suva

Tel: (679) 3100 598

Fax: (679) 3100 582

Email: nuniat@naturefiji.org

CONSERVATION INTERNATIONAL

Pacific Islands

BIODIVERSITY CONSERVATION LESSONS LEARNED TECHNICAL SERIES

12