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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:**

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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 MaraquetiViti'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 (Appendix 1).

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 MaraquetiViti 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 on Laucala 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.

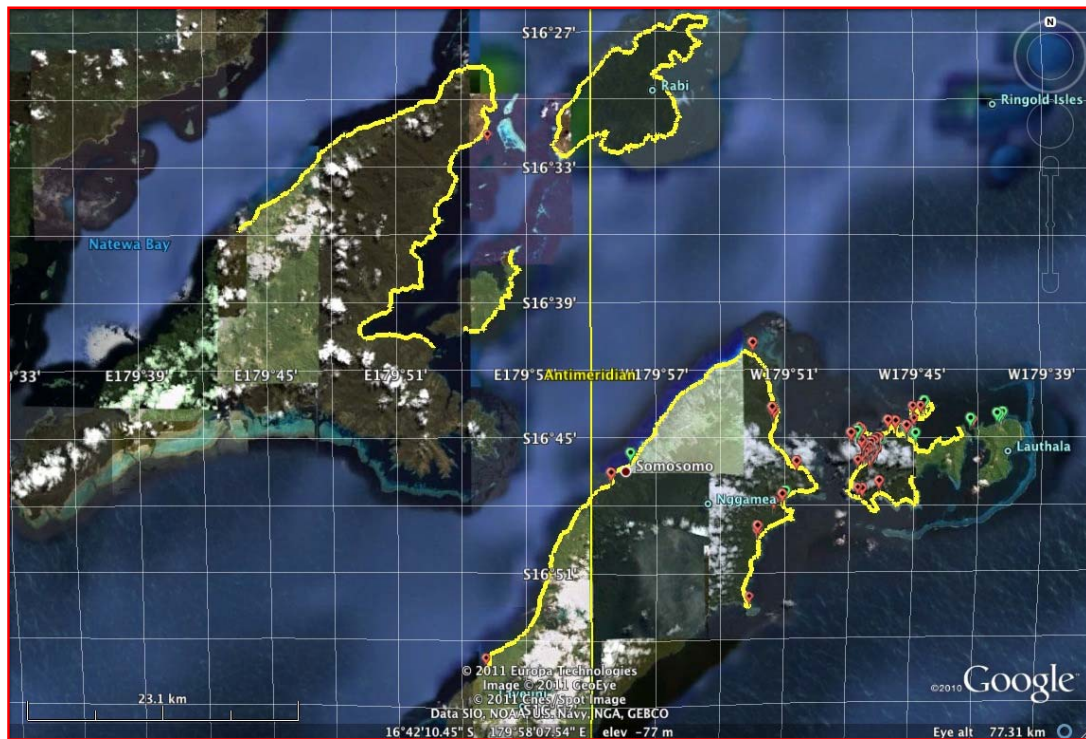


Figure 2. Map showing area surveyed for American iguanas and recorded sighting locations. Red points represent reported or observed sighting locations, green points represent approximate sighting locations and yellow lines represent areas surveyed.

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.

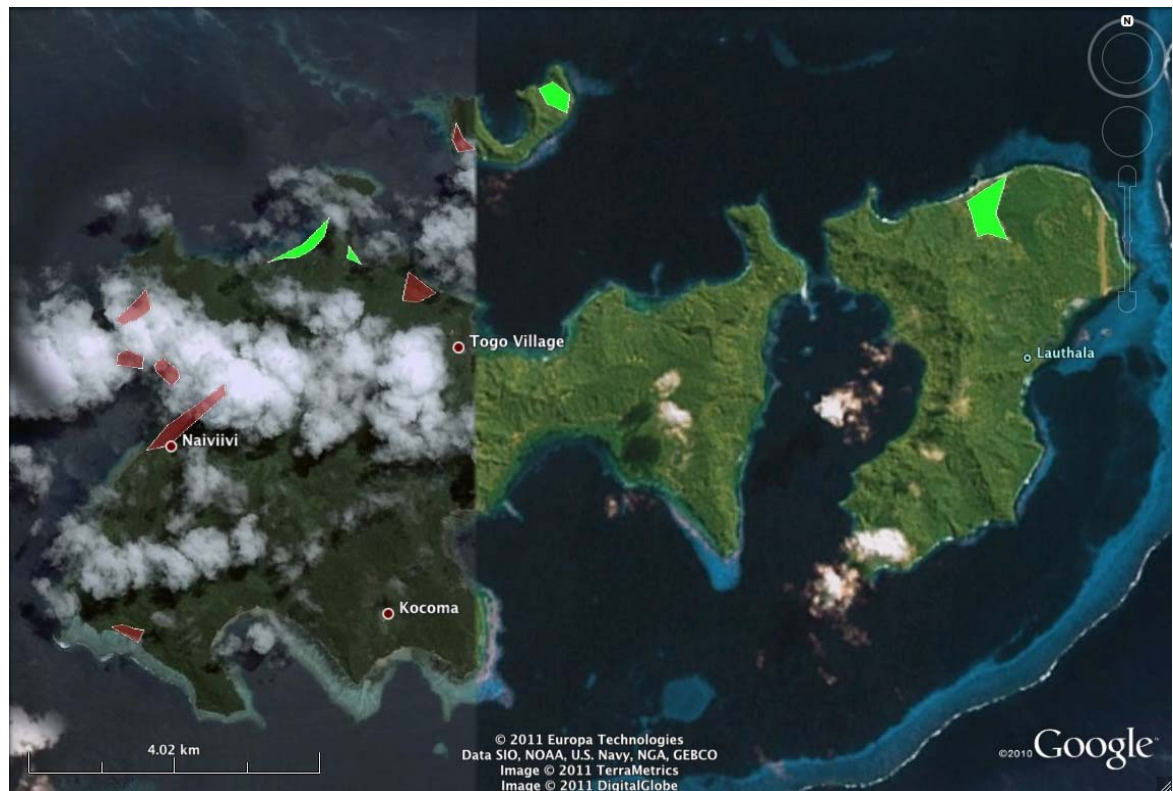


Figure 3. American Iguana nesting areas. Red areas represent locations where gravid females with shelled eggs have been caught, groups of hatchling seen or actual nests located or a combination of these findings. Green areas are sites with ideal nesting habitat and where resident adult iguanas are known.

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 *Bruguiera 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
<i>Morinda citrifolia</i>	Kura	RVV others
<i>Pongamia glabra</i>	Vesivesi	RVV others
<i>Erythrina variegata</i>	Drala	RVV others
<i>Merremia peltata</i>	Wabula	RVV others
<i>Ipomoea batatas</i>	Kumala	RVV others
<i>Abelmoschus manihot</i>	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 Lilo Surumi
<i>Bruguerra exorrhiza</i>	Dogo	Bejju (Yaroi caretaker) and others
<i>Colocasia esculenta</i>	Dalo	Reports but no evidence
<i>Mangifera indica</i>	Mago	Jerry Surumi and Pita Bua
<i>Terminalia catappa</i>	Tavola	Arthur Mitchell, Lilo, and others i.e. Jone from Saravi
<i>Hibiscus</i> 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 released at 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

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**APPENDIX 1:
REPORTED SIGHTINGS AND OBSERVATIONS.**

The American Iguana in Fiji

May-August 2011

Island	Date	Time	Location	Location	Location	habitat	micro-habitat	Sex/age class	Behaviour	Reported by	Evidence	Evaluation	1-4 Notes
Qamea	Jan-10	?	Naiivivi village	516.76921	W179.78682	beach crest	Drala tree	Hatchling	feeding/baski	Lilo Surumi	Climbing?	?	1 Several others found close by around the same time.
Qamea	Jan/Feb 2010	?	Naiivivi village	516.76922	W179.78639	Disturbed Fore	Coconut palm	? Adult	Climbing?	Pela ?	Caught and killed	?	1 Next to the last house in Naiivivi ~5m from the creek.
Qamea	Jan/Feb 2010	morning	Naiivivi beach	516.76835	W179.78516	Disturbed fore	beach-concrete	M Adult	Came out of	Lilo Surumi	Good descript	?	2 Fed 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	516.76740	W179.78328	Introduced ga	Hibiscus hedg3	3 Adults,M,F,F	Feeding/baski	Pita/Ana Tabu	Photos and m	?	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 2011	Morning	Vatusogoso	516.76732	W179.77905	Vegetable gar	garden	1 F Adult	Nesting	Apisia	Kept by Jerry	?	1 <10m from the creek, another individual seen close to here July 2011
Qamea	Jan/Feb 2011	Afternoon	Close to Nauri	516.95335	W179.77582	Riparian/Mang	Merremia peti	Male Adult	Basking/Feedi	Apisia (Taraga Apisia's brothe		?	1 Close to George Williams brothers house.
Qamea	May 2011	Morning/After	Nauradua	516.75951	W179.77750	Riparian/Mang	Mangroves, vi	5 Male/Female	Basking/Feedi	George William	Apisia and oth	?	1 Tail mangroves here bordered by forested slopes.
Qamea	Jan/Feb 2011	Afternoon	Saravi	516.76161	W179.78001	Riparian/Mang	Merremia peti	Male Adult	Basking	Apisia (Taraga Apisia gave to		?	1 At least 3 to have been killed close to this location-over the past 3 years
Qamea	28-May-11	13:07	Saravi	516.76166	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	516.76161	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	516.76352	W179.78905	Forested Head	? Vinematt cof	Adult, M, Ad	Mating	RVV	RVV	?	1 This pair were seen in the same location several weeks later-female was caught and transmitted.
Qamea	?	?	Slopes behind	516.77498	W179.78432	Garden/forest?	?	?	?	Jerry Surumi	several others	?	4 Information seems a bit scetchy
Qamea	?	?	Slopes behind	516.77345	W178.313	Garden/forest?	?	?	?	Jerry Surumi	several others	?	4 Information seems a bit scetchy
Qamea	May/June 2011	Morning	Lovoni creek	516.76720	W179.78308	Riparian/Mang	On the ground	M, F pair?	Mating?	Jerry Surumi	Good descript	?	2 Around mating season and male and female iguanas have been observed regularly close to this site.
Qamea	29-May-11	Morning	Natiro-behind	516.76837	W179.78554	Disturbed fore	Morinda citrif?o	Juvenile	Feeding	Small group	Other sighting	?	2 Evidence to feeding on the mention tree, and other trees close by (Kura and vesi vesi).
Qamea	Jan-11	Morning/After	Naiivivi village	516.76981	W179.78804	Disturbed fore	Drala tree, pa1	7 Hatchlings	Feeding/baski	Lilo, many oth	Several were c	?	1 Heard reports of these individuals many times.
Qamea	72006	?	Lali	516.74712	W179.76436	Settlement	?	Adult	?	Alice Hefferna	Photo	?	2 Didn't see the photo but apparently there is one and it was reported to the authorities?
Qamea	16-Jul-11	Morning	Nidilo	516.79134	W179.77711	Mangroves	Red mangrove	M Adult	Basking/Feed 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	516.75031	W179.75574	Coconut plant	Ground, cocon Adults, Juveni	?	Feeding	Sam Mitchell/ Many others d		?	1 Several have been collected from this site, some have been transferred to Tavuni 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	516.75299	W179.79095	Garden	paipaw	Adult	Feeding	Phillipe (care	Good descript	?	2 Sees iguanas here semi regularly
Qamea	1-Jun-11	16:10	Headland btw	516.75578	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	516.76694	W179.78219	Riparian/Mang	Coconut palm	? Med Adult	Basking	Sony (Jerry St	Seen by many	?	1 I caught this individual some weeks later-spear injury in the leg.
Qamea	? 2009	?	? Beach north	516.79685	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	516.74648	W179.77019	Littoral/beach	Ground	Male Adult	Walking	Thomas Mitchel	? Taraga ni koi	?	2 Good description-Tomas has also seen hundreds of hatchlings at Yaragau (his brothers place) among the water plants on the small pond.
Qamea	2010	Afternoon	Niubalavu	516.75044	W179.75384	Coconut plant	Ground	Hatchling	Basking	Tommas Mitchel	Just his word	?	4-Jan The individual was brought by picnicians back to Tavuni?
Qamea	8-Jun-11	11:00	Btw Saravi ani	516.76303	W179.78342	Mangroves	Red mangrove	M Adult	Basking	RVV	I saw it, it fed	?	1 I believe I caught this individual at a later date.
Qamea	Mar-11	morning	btw Saravi ani	516.76303	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	516.76136	W179.79070	Riparian/Mang	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	516.76185	W179.79037	Forest	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	516.76354	W179.78911	Forested Head	? Vinematt cof	Adult, M, Ad	Mating	RVV	RVV	?	1 This pair were seen in the same location several weeks earlier-female was caught and transmitted.
Qamea	28-May-11	Afternoon	Saravi	516.76101	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	516.76101	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	516.76101	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	516.76101	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	516.76101	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	516.76101	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	516.76075	W179.78037	Human Dwelli	furniture	M Adult	? Resting/fora	Jone and his w	Others to Jerry	?	2 Caught and killed inside their house.
Qamea	16-Jun-11	morning	Saravi	516.76101	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/After	Saravi	516.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone's wife	a lot of feedi	?	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	516.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Jone (Saravi)	a lot of feedi	?	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/After	Saravi	516.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Dickson/Ba	ana a lot of feedi	?	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/After	Saravi	516.76101	W179.78027	Riparian/Mang	Drala tree	M Adult	Basking	Dickson/Ba	ana a lot of feedi	?	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/After	Nauradua	516.75964	W179.77738	Riparian/Mang	Mangroves, vi	M Adult	Basking	Bonnie William	Also seen by C	?	2 Plenty of activity on this week.
Qamea	14-Jun-11	Afternoon	Yaragau-east	516.76363	W179.78894	Forested Head	Large stone	M Adult	Basking	George William	I have seen th	?	2 Plenty of activity on this day, seems to be a genuine sighting.
Qamea	20-Jun-11	Afternoon	Waibulu	516.76708	W179.77607	Riparian/Mang	Vine matt	? Adult	Basking	? 2 women fr	Reported to Je	?	2 Other kids have reported a similar sized iguana around this location
Qamea	21-Jun-11	Afternoon	Natiro landing	516.76726	W179.78794	Natiro landing	?	Juvenile	Basking	Lilo Surumi	Other sighting	?	2 Saw swimming when coming across from Vatusogoso
Qamea	20-Jun-11	16:00	Saravi	516.76222	W179.78038	Water	M Adult	Swimming	Ella (Jone's w	Good descript		?	2 Saw swimming when coming across from Vatusogoso
Qamea	16-Jun-11	16:00	Saravi	516.76235	W179.78082	Water	M Adult	Swimming	Ella (Jone's w	Good descript		?	2 Saw swimming when coming across from Vatusogoso
Qamea	23-Jun-11	10:00	Lovoni creek	516.76098	W179.78212	Riparian/Mang	Vesi vesi	M med Adult	Feeding/Baski	RVV	Captured and	?	1 Leg injury apparently from a spear thrown by kids-killed.
Qamea	23-Jun-11	12:20	Btw Saravi ani	516.76307	W179.78337	Riparian/Mang	Red mangrove	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 ani	516.76310	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	516.76299	W179.78412	Riparian/Mang	Red mangrove	M 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	516.76301	W179.78414	Riparian/Mang	Red mangrove	F Adult	Basking	RVV	Escaped to wa	?	1 A large male seen earlier.
Qamea	24-Jun-11	13:00	Yaroi	516.76307	W179.78337	Riparian/Mang	Red mangrove	F Adult	Hiding mangr	RVV	Escaped to wa	?	1 A large male near Saravi-seen previously, escaped with nose around its neck. Fled to water.
Qamea	28-Jun-11	13:57	Saravi	516.76161	W179.78002	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	16:44	Yaroi	516.76350	W179.78447	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Captured and	?	2 Several others seen in this location
Qamea	28-Jun-11	13:00	Qamea beach	resort	?	Rocky ridge	Rock	M Adult	Basking	George William	Other sighting	?	2 Many reports of an American iguana at this site in 2010.
Qamea	20-Jun-11	13:00	Naiivivi village	516.77077	W179.79007	Creek	Ground	? Adult	Walking	RVV	Track leaves c	?	1 Probably the same animal the kids reported seeing on the 24 June 2011
Qamea	24-Jun-11	Afternoon	Naiivivi village	516.77079	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	516.76373	W179.78623	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	516.76305	W179.78424	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	?	1 Large male took off immediately.
Qamea	6-Jul-11	16:30	Yaroi	516.76297	W179.78404	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Captured and	?	1 Large male recaptured previous capture attempt.
Qamea	3-Jul-11	Afternoon	Yaroi	516.76361	W179.78433	Riparian/Mang	Red mangrove	? Juvenile and	feeding/baski	Bejuu and Silw	Good descript	?	2 2 iguanas seen here by Bejuu etc feeding on mangrove leaves?
Qamea	8-Jul-11	15:42	Yaroi	516.76359	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 Bejuu.
Qamea	14-Jul-11	11:00	Saravi	5	?	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Captured and	?	1 Snapped the noosed pole, had to run down across the mud flats-low tide.
Qamea	25-Jul-11	16:20	Nukubalavu	516.75443	W179.79763	Rocky ridge	Rock	? Med Adult	Basking	RVV	Unable to get	?	1 30m up rocky cliff
Qamea	27-Jul-11	9:00	Lovoni	5	?	Riparian/Mang	Red mangrove	F Adult	Basking	RVV	6m up on edge	?	1 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	516.76222	W179.79791	Riparian/Mang	Red mangrove	M Adult	Basking	RVV	Escaped to wa	?	1 Same animal that had nose break around its neck, escaped yet again.
Qamea	31-Jul-11	15:40	Naiivivi village	516.77426	W179.79361	Littoral/beach	paipaw	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	Saila beach	?	?	Littoral/beach	ground	? F Adult	Walking	Steele	Captured and	?	1 Gravid female caught by Steele
Qamea	2-Aug-11	9:45	Saravi	516.76107	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	516.76175	W179.78015	Riparian/Mang	Merremia peti	M Adult	Basking	Jone and his w	Repeatedly seen	?	1 I have seen the animal they talked about 3-4 times very close to this location-nose snapped
Qamea	2-Aug-11	12:40	Yaragau	516.76185	W179.79037	Garden	Tavota	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	516.76305	W179.78425	Riparian/Mang	Red mangrove	F Adult	? R/VV	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 Vomu	516.78518	W179.94665	Riparian/Mang	? M Adult	? Adult	?	?	Fiji times new	?	1 Caught and killed, not sure by who.
Taveuni	14-Jun-11	Afternoon	Matei	516.68905	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	516.73673	W179.86023	Ground	Red road	? Adult	Walking	RVV	Bus load of pe	?	3 Many reports of this animal-still alive.
Taveuni	2010	?	Qeleni	516.73942	W179.85892	Riparian/Mang	? Red road	? Adult	Basking	? R/VV			

APPENDIX 2. CAPTURE DATA

Island	Site	Date	time	Weather brief	Location	Location	Tree species	Perch height	Ground	Over water	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	I get this from I	?	?	?	?	?	F	Contained 34 shelled oviductal eggs, weighing 13.7g each.	316	1085	1256	Killed	?	Pete harlow	get more info
Malaga Island	Natangi Resor	8-Sep-10	?	?	get this from	I get this from I	?	?	?	?	?	F	Contained 52 shelled oviductal eggs, weighing 15.5g each.	392	1390	2283	Killed	?	Pete harlow	get more info
Qamea	Niubalavu Sett	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, oviductal eggs-weighing 12g each.	365mm	1035mm (Tail regen 2)	2400	Transmitted, 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	Transmitted, 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	Transmitted, 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	Transmitted, 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	Transmitted, 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	Transmitted, 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	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 bi	no	M	NA	130mm	500mm	200	Killed (3 Aug 2011)	Basking	RVV	Top of pawpaw
Qamea	Saila	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)	6m	no	Yes	no	F	Contained 24 shelled, oviductal eggs-weighing 9g each.	300mm	68mm (Regen)	900	Killed (3 Aug 2011)	resting/inactiv	RVV	Appears to ha