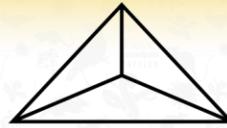




Predator Free  
Pacific



PRISMSS

Pacific Regional Invasive Species Management Support Service



RESTORING  
ISLAND RESILIENCE

TECHNICAL SUPPORT TO MELAD IN RAT ERADICATION, BIOSECURITY  
MOTU SURVEYS, AND SEABIRD MONITORING AT KIRITIMATI, KIRIBATI,  
NOVEMBER 2023



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A Pacific Bioscapes Report for BirdLife Pacific and Government of Kiribati.



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Frontespiece - Te Ruru circling Big Nimroona in the evening, 13 November 2023.

## EXECUIVE SUMMARY

Field support and training was provided to Government of Kiribati staff at Kiritimati (Christmas Island) during 1-15 November 2023 as part of a Biopama project facilitated by BirdLife/SPREP. This project focused on rat eradication for biodiversity recovery, and associated outcome monitoring and capacity building. Specific objectives (and outcomes) included eradicating Kimoa (*Rattus exulans*) which had reinvaded Big Nimroona and SW Nimroona motu in 2017 (both motu were baited 6 days apart); confirming the status of invasives and birds on other key motu (checks of other significant motu indicated that Kimoa remain absent and rat-sensitive birds are thriving as a result); monitoring of endangered seabirds revealed that the Kiritimati population of Te Ruru continues to increase, while a large number of smaller motu provide secure nesting for Te Bwebwe ni Marawa; determining island and motu biosecurity needs (detailed biosecurity needs lists were completed and motu surveillance protocols adapted); and some additional training was completed for all.

## 1.0 BACKGROUND AND OBJECTIVES

Kiritimati supports globally important breeding colonies of many seabird species, including the endangered Phoenix Petrel (Te Ruru) and Polynesian Storm-petrel (Te Bwebwe ni Marawa), and important populations of many other seabird species spanning tropicbirds, frigatebirds, boobies, noddies and terns, plus the vulnerable Bokikokiko or Christmas Island Reed-Warbler (VU). Beginning in the late 1970s and 1980s the UK, US and especially NZ government agencies supported the WCU in advancing pest management and anti-poaching strategies, such as the eradication of pigs and wild dogs, rat and feral cat management, all usually accompanied by tactical plans (Perry 1980, Clark 1991, Anderson 2000, Pierce et al. 2007, Pierce et al. 2018).

The first successful Kimoa (*Rattus exulans*) eradications from Kiritimati motu were completed in 2009 when Kimoa were removed from 23 motu spanning 40 ha, thereby doubling the secure area for safe nesting by birds at Kiritimati (Pierce and Brown 2009). That work was funded by multiple agencies including Critical Ecosystem Partnership Fund (CEPF via CI), NZODA, and Pacific Invasives Initiative (PII). A few more motu were added to the rat-baited list by WCU staff in subsequent years, with c.30 rat free motu secured for the following 10 years. However, two important Te Ruru motu - SW Nimroona and its connected partner Big Nimroona - were reinvaded by Kimoa in 2017, some 8 years after baiting (K Taabu pers, obs., Pierce et al 2018).

The objectives of this work in November 2023 were to:

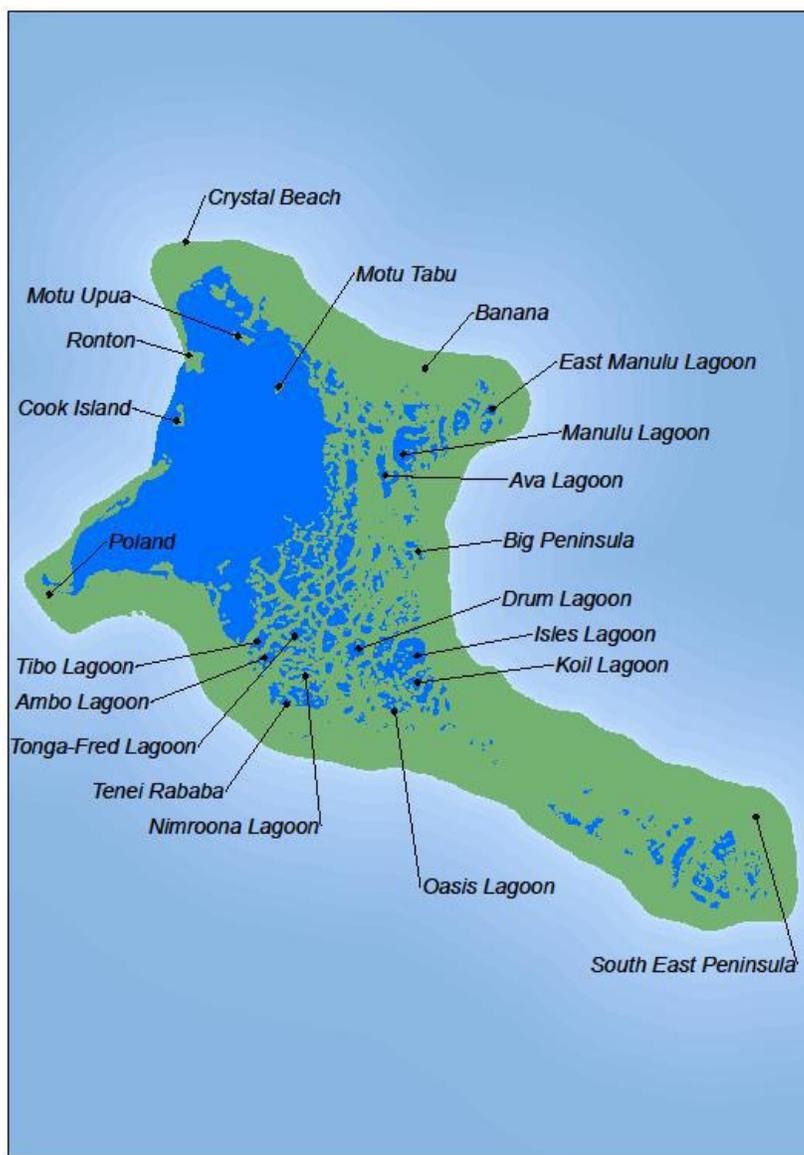
1. Undertake baiting of rats on reinvaded Big Nimroona, SW Nimroona, and also the small NW Nimroona, in case it had also been reinvaded,
2. Complete the 2023 monitoring of Te Ruru and Te Bwebwe ni Marawa at priority motu,
3. Survey other key motu to evaluate changes in pest and seabird status since 2009,
4. Review progress in island pest and biosecurity measures for Kiritimati and PIPA in order to identify any specific issues needing addressing in 2024,
5. Review progress in biosecurity for lagoon motu and work with staff to refine approaches as needed.

## 2.0 KIRITIMATI TIMETABLE

November 2023 activities were as follows:

Tu 31 Oct	Travel via Brisbane and Nadi
We 1 Nov	Arrive CXI, planning with WCU leader Ata Binoka and SCO Katareti Taabu.
Th 2 Nov	Am, visit Motu Upua with SC, KT and AI (see Appendix for full names); meet MLPID Minister Mekarite Temari at his office and again at his evening function.
Fr 3 Nov	Am, biosecurity meeting followed by visit to port and copra facilities to help identify improved approaches. Pm office.
Sa 4 Nov	Office day awaiting transport
Su 5 Nov	Checked YCA incursion area at Fisheries; office day awaiting transport
Mo 6 Nov	Office day – format, report outline, etc.
Tu 7 Nov	Gridded and baited SW and Big Nimroona, team of 5.
We 8 Nov	Office am. SC departs pm. RP and TT completed the remaining baiting lines east end of Big Nimroona (25 kg) and southern edge including opposite Little Big N (5 kg); then completed motu fly-ons for Te Ruru and Te Bwebwe ni Marawa in evening.
Th 9 Nov	Morning discussion of rat, seabird and YCA issues, notify owners re property surveys, Pm survey Tanguoua motu for fly-ons with BK and KK.
Fr 10 Nov	YCA survey 0800-0900. Surveys of Cook Islet, Motu Upua and Motu Tabu postponed due to boat not starting. Diverted to 4 km Bokikokiko transect.

Sa 11 Nov	Central lagoons to complete visuals of motu and fly-on surveys with KT.
Su 12 Nov	John Bridon meeting am re historic rainfall and conservation management; Manulu Lagoon surveys pm.
Mo 13 Nov	Rebaited Nimroona motu – team of 6. KK and Bauro also surveyed Tonga-Fred via kayak, RP evening fly-ons
Tu 14 Nov	Office am. Main lagoon motu trip cancelled due to motor issues
We 15 Nov	RP travel to Fiji
Th 16 Nov	RP travel to Cairns



**Christmas Island key biodiversity locations**

Fig. 1 – Approximate locations of some key sites at Kiritimati

### 3 NIMROONA MOTU RAT BAITING

The reinvasion of Big and SW Nimroona was confirmed by WCU in 2017 following 8 years of successful rat exclusion. It was considered worthwhile to rebait these two motu given the likelihood of them staying rat-free for many more years, allowing a period of high seabird productivity. Bait comprising 20R from Orillion in New Zealand was shipped to Kiritimati via Fiji in 2023. Some lessons from the current importation included that there is only a single shipping line servicing CXI from NZ (the South Pacific) which runs 2 (max 3 times a year). It is critical that a bait shipment ex-NZ is on the sailing to CXI and needs to be managed alongside the NPDL (Southern Pearl) departure date, along with bait manufacture schedule and baiting window. Bait must be packed in conditions that maximise protection from moisture/condensation, i.e. buckets may be better protected with a cardboard layer between the bait and plastic, wrapping of the pallets improved from just clingfilm as the only moisture barrier. All permits and clearance documentation must be approved and in place prior to bait arrival on CXI. Bait must be cleared immediately on arrival at KPA. It was apparent from the current shipment that the container had gone through a devanning process over several days, during which the bait pallets had been moved outside and got wet resulting in extensive damage to bait in bags and buckets as a consequence of pallets being saturated and subsequent condensation once stored back in the container. In future, immediate release from the KPA and transfer of the bait to WCU facilities will reduce the likelihood of it being damaged.

The Nimroona islands were gridded at 25 m and first baiting occurred on 7-8/11/23 at 15 kg/ha. The second baiting occurred on 13 November and was also applied at c.15 kg/ha and on the adjacent Little Big Nimroona (0.6 ha) and amounted to 50 kg on SW Nimroona, 80 kg on Big Nimroona and 10 kg on Little Big Nimroona, the latter being treated just the once. No live rats were seen during the second baiting, but several dead kimoa were found. No significant rain fell between the first and second applications. About 20 mm fell the day after the 2<sup>nd</sup> application. Bait was still present on Big and SW Nimroona at the time of the second application.



Fig 3.1 – Baiting team on SW Nimroona 13 November 2023.

Signage was erected to warn any visitors of baiting. No measure of success will be possible until August 2024. Foods of Kimoa at the time of baiting would likely have included flowers of *Tribulus*, and potentially *Sida fallax* and *Heliotropium*, all of which were flowering prolifically.

#### 4. MOTU SURVEYS

Surveys were undertaken ashore and/or from the mainland to assess threats and determine what birds and other native biota are present on key motu. Motu Upua was visited to help in planning for kimoa eradication there in 2024, the smaller Tonga-Fred motu to test for any kimoa reinvasion since 2009, and a general survey of Big and NW Nimroona during the 2023 baiting operation. WCU had already visited the key motu of Big and North Drum and Motu Tabu and Cook Islet in 2023. Many other motu were observed from the mainland and bird species present enabled pest status to be inferred.

Key results are noted below, and island-specific details are provided in Appendix 2.

##### Motu Upua

Motu Upua (c.25 ha) continues to support Kimoa, but we found no evidence that Black Rats had reached the island. The potential for Black Rat invasion from the nearby mainland had been a factor in setting priorities for motu for rat eradication in 2009 (Pierce and Brown 2009). An old WWII aviation fuel pipeline, potentially providing rodent access across the tidal flats to Motu Upua, is now broken. Meanwhile, coconuts (which attract Black Rats) were eradicated from Motu Upua by WCU in about 2000 and subsequent seedling removal, has been entirely successful. There is still no evidence of Black Rats invading any of the seabird motu, all suggesting that Motu Upua (and others) should continue to remain secure from rat) invasion well into the future. There are some non-target baiting concerns (waders, see below) and local crab interference matters, the former of which would be overcome by mid-year (July-August) baiting, and the latter through an appropriate baiting regime. Some other needs include preparing bait lines (for a 25x25 grid) which will require some scrub cutting for up to 2 days for 4-6 people. Training in navigating to/identifying baiting points will be needed and enough bait to complete a single application should be available in buckets the second application in bags. A tarpaulin will be sufficient to protect the buckets/bait on the boat trip across from Ronton.

About one third of the Kiritimati seabird species were attempting to nest on Motu Upua in November 2023, some of them apparently successfully, including a few Te Ruru (Phoenix Petrel), Tanguoua (Wedge-tailed Shearwater), Te Mangakiri (Black Noddy) and Te Matawa (White Tern). Others appear to be attempting to nest including about 6 Te Raurau (Blue Noddy) and also Te Oi (brown Noddy), and others were seen flying overhead including all of the favoured birds for hunting (boobies, frigatebirds, tropicbirds). Groups of up to 12 Te Kewe (Bristle-thighed Curlew) were observed at high tide and an estimated 20+ were foraging in the island's Beach Heliotrope flats, along with 30+ Te Kun (Pacific Golden Plover) and 3+ of each of Wandering Tattler and Ruddy Turnstone. Crabs (*Cardisoma carinfex*) were locally common in a few patches and skinks rare.

Once de-ratted, Motu Upua would provide the best extensive breeding habitat on Kiritimati for rat-sensitive seabirds with extensive Beach Heliotrope and grasses (suitable for nesting of Te Ruru, Te Bwebwe ni Marawa), soft sand well-vegetated with Boerhavia, Te Wao (Beach Heliotrope), Te Mao (*Scaevola*), tussocks and Te Kaura (*Sida fallax*) (all stabilizing plants for Te Tanguoua burrows), and open areas for Te Raurau and other terns and noddies. Moreover, the extensive Te Ren (*Tournefortia*) and Te Mao, would provide much suitable habitat for the

currently absent Bokikokiko, and Te Ntanini (*Cassytha* vine) would provide nest material, while their gecko and insect prey base would recover post-rat as has occurred elsewhere on de-ratted motu in the central lagoons. If eradication is successful it would be a good tactical island for trialling Bokikokiko translocations (VanderWerf and Pierce 2019).



Fig 4.1 (above) - Katareti and Steve surveying Motu Upua habitats, note Te Ren background.  
Fig 4.2 (below) – Katareti surveying petrel and shearwater habitat – sand and dense low cover.



### Drum and North Drum

These were visited by WCU staff earlier on 19 April 2023. They confirmed that Kimoa were absent and the motu had healthy populations of seabirds including breeding colonies of Kimoa-sensitive species (K Taabu pers. comm). Observations of Te Ruru and Te Bwebwe fly-ons during the current survey concurred (refer Section 5).

### Frigatebird and SW Koil (Koil)

Frigatebird (8 ha) was viewed from the mainland by KT and RP on 11 November 2023 and again by RP around sunset two days later when SW Koil was also viewed. Both motu are covered in Te Boi (*Sesuvium*) and SW Koil also has much dense grass, while Te Ren and other woody shrubs on Frigatebird are being flattened by mainly Lesser Frigatebirds (Te Etei), 900+ of which were present on this motu on 13 November, their only breeding site on Kiritimati. Other notables were 35+ Te Kibwi and large numbers of rat-sensitive birds apparently breeding on both motu including Te Raurau, Tarangongo, Te Io, and Te Bwebwe ni Marawa, collectively suggesting that SW Koil and Frigatebird Motu are still rat-free following de-ratting in 2009 and 2012 respectively. Whilst these rat-sensitive species can occur and attempt to breed on motu with Kimoa, they are invariably present in low or depleted numbers, as is the case at Motu Upua and Big and SW Nimroona in November 2023. On smaller motu and motu with uniform vegetation, there is even less potential for these sensitive birds to establish in the presence of Kimoa.

### Big and SW Nimroona

These motu were the focus of baiting on three days in November 2023. Both had extensive ground cover, particularly Big Nimroona, and this comprised Te Kaura, Te Mao, dense grasses, Te Wao, Te Ntanini, Te Maukinin (*Tribulus*), Te Boi and a perimeter of Te Ren. Of the two motu, Big Nimroona also had better soft sands for burrowing seabirds. Nearly all of Kiritimati's seabird species were attempting to nest at these two motu (Appendix 3) despite the presence of Kimoa. The larger birds (Te Koota, Te Taake, Te Etei) appeared to be breeding successfully, and some Tarangongo fledglings were also seen, but not Te Raurau, Te Io, and Te Bwebwe ni Marawa. Poached seabirds from earlier this year included c. 30 Te Koota and c. 10 Te Etei.

### Big South Nimroona and outliers

These motu were visited ashore by WCU staff on 19 April 2023 who confirmed that Kimoa were absent given no rats were seen and no predation was seen on sensitive birds' eggs (K. Taabu pers. comm.). During the current surveys, concentrations of Te Ruru and other more sensitive breeding birds, i.e., Te Raurau, Tarangongo, Te Io and Te Bwebwe ni Marawa, were seen which is consistent with them being rat-free.

### Big Tonga-Fred and East Tonga-Fred

These motu were surveyed ashore by KK and BK on 13 November 2023, this being the first visit since being baited in 2009. The vegetation was relatively sparse, but included Te Ren and Te Mao, the former providing cover for nesting Te Koota and Te Etei. Notably, about 30 Te Kibwi were present on each, which along with other islands surveyed, suggests that this species continues to increase in numbers at Kiritimati. Te N'na and Te Oi were also present. Te Ruru counts have declined, however, likely reflecting the paucity of ground cover for nesting. No rats were seen and no sign of rat or cat predation was found.

### Motu Tabu and Cook Islet

These islands were visited by WCU staff multiple times during 2023, Both were confirmed free of Kimoa and had healthy seabird populations (A Binoka, K Taabu, pers. comm.). WCU to try for Te Ruru fly-ons here and on Motu Upua late November/December.

### Big Ambo, NW Ambo, Big Tibo, Iareto, Poland Big Grassy, Poland Little Grassy

These 6 motu are all viewed from the mainland for 1-2 evenings each. They are well vegetated with grasses and other low cover. The first three were de-ratted in 2009 (Big and NW Ambo) and 2012 (Big Tibo), and the last 3 have been rat-free since 2009 or earlier. All 6 appear to be rat-free now, as they all support nesting Te Bwebwe ni Marawa and many other rat-sensitive species (Appendix 2).

### Tenei Rababa (three motu totalling c.6 ha)

Not visited November 2023, but East Tenei Rababa was viewed twice from the mainland (RP). No birds were seen on both occasions, suggesting that rats, and potentially cats, are present.

## 5.0 SEABIRD MONITORING

Te Ruru congregate around motu during the late afternoon and evenings, allowing an index of abundance to be calculated for that species. Meanwhile, Te Bwebwe ni Marawa start to drop in to their breeding motu just before sunset, allowing presence/absence to be determined (Pierce et al 2018, 2021).

### Te Ruru

Ten of the 12 priority Te Ruru motu were counted in December 2023, with WCU panning to visit the other two as soon as boat access is possible. Up to 3 replicate counts were undertaken mainly on nights of darker moon phase for some of the more important and accessible sites. Results were interpreted in relation to predator and poaching status in 2007-23. Numbers of circling birds at most motu appear to be at least stable to increasing, with those at the two most populous motu – Big Drum and Big Nimroona– showing significant increases since 2011 (Fig 5.1, 5.2). Big Drum and Big Nimroona were both de-ratted of Kimoa in 2009 (Pierce and Brown 2009), but Kimoa reinvaded Big Nimroona via SW Nimroona after 8 years in 2017 (K Taabu pers. comm.), while Big Drum has remained rat-free for the following 14 years to 2023. These many years of rat-free status has enabled productive breeding at Big Drum (14 years) and Big Nimroona and SW Nimroona (8 years), likely being the main contributor to the increases at the two islands, perhaps with some social recruitment. That SW Nimroona has not seen a similar increase in numbers following 8 years of rat-free status may be due to combinations of poorer nesting cover and higher poaching levels at that motu which is more accessible to humans. It was noticeable that SW Nimroona was also depleted of the preferred target species of poachers – Red-tailed Tropicbirds, Red-footed Boobies and Great Frigatebirds, all of which were breeding successfully on Big Nimroona and Big Drum, and some 2023 poaching had occurred on Big Nimroona and SW Nimroona.

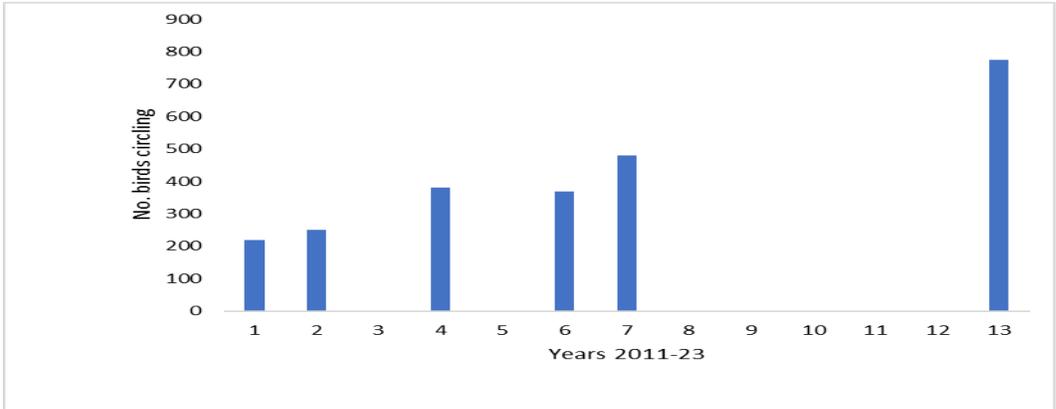


Fig 5.1 (above)– Mean fly-on counts of Te Ruru at Drum 2011-23, de-ratted in 2009. Add errors.

Fig 5.2 (below) – Mean evening counts of Te Ruru circling Big Nimroona and SW Nimroona 2011-23, de-ratted in 2009, Kimoa reinvaded 2017.

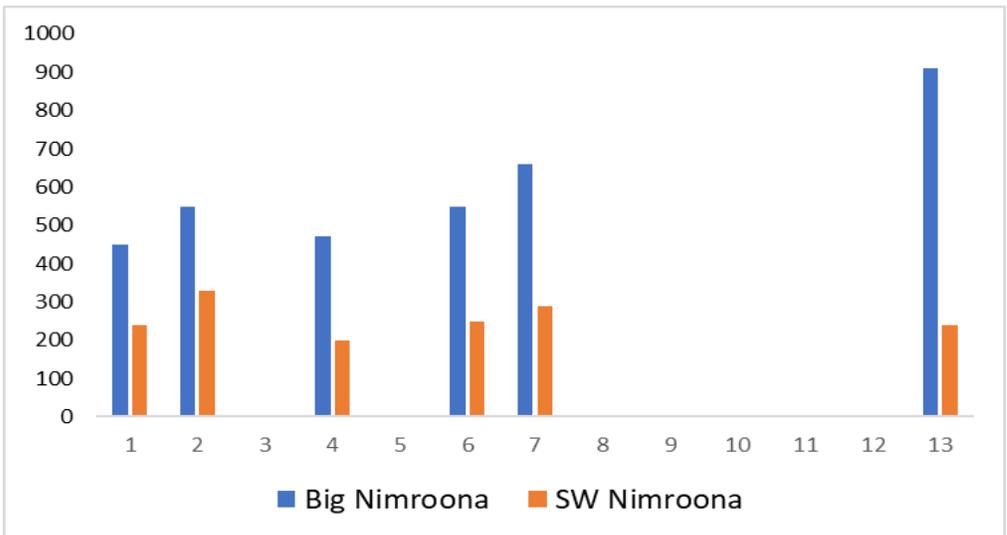


Fig 5.3 – Te Ruru exhibit a white leading edge to underwing and variable whitish throat.

### Te Bwebwe ni Marawa

About 20 small motu were checked for Te Bwebwe ni Marawa where they have been known to occur in the past, along with some others from which they had disappeared during storm events in the 2010s. Most of the designated monitoring motu (Pierce et al 2018) were observed in the evening until storm-petrel landings were seen, or in a few cases where none were seen, they were revisited on another date. Encouragingly, all previously utilized motu were being used in November 2023 (Appendix1). Moreover, some previously unfrequented islands in 2018 were now being used in November 2023. Two factors have likely contributed: firstly the recovery of grasses and other plants on many small motu that had been flooded (following storm-flooding in early 2010s). Secondly several of the larger motu that were de-ratted in 2009, were seen being utilised by storm-petrels this year (Appendix 1-3). More time would be required to confirm actual numbers of storm-petrels breeding on some of the large motu such as Big Drum and Big Ambo.



Fig 5.4 – Te Bwebwe ni Marawa landing in dense vegetation of Te Boi and Maukinin on a NE Manulu Lagoon motu.

## 6.0 FERAL CATS AND YELLOW CRAZY ANTS

### Feral cats

While we couldn't address feral cats in any extensive way, an average of 1.5 feral cats (max 3, n= 4) were sighted nightly in the Carver Way – Central Lagoons area and will continue to be impacting vulnerable tern and shearwater and petrel colonies where these are on or linked to the mainland, e.g. E Drum, NW Tonga-Fred, Big Peninsula. Resumption of a sustained trapping programme is essential to the protection of these colonies, starting first with Big Peninsula, and should be augmented with kill traps including SA2 traps. Traps dispensing cat toxins, while still in development, could provide additional alternatives and would be worth investigating.

Currently the pump-action shotgun is broken and needs mending and/or replacing with a new shotgun, preferably also pump-action, if not whatever is permissible. For deployment of traps and use of firearms, there is a clear need for a fleet of roadworthy vehicles.

### YCAs

An incursion of YCA was originally detected in Ronton during a biosecurity workshop in March 2013 (PII 2013) and subsequently treated with Antoff/Fipronil by WCU with the support of Pacific Biosecurity. There were no subsequent reports of YCA until a few were found on Noni plants by RP in 2019 (Pierce et al. 2019) and subsequently treated with Antoff and monitored by WCU. During the current visit on 5 November 2023, RP found a small YCA infestation on Noni plants in the exact same location at 1.367 N; 157.47223 E. Staff from WCU and Biosecurity (Ataiea Ioane, Etita Taunga, Jason Maen and Susanna Ratu and RP checked all c.100 Noni throughout the original infestation area at 0800-0900 h on 10 November and found YCA on the same two Noni as found a few days previously, but no others. However, worker ants were subsequently found in two new locations outside that original infestation and treatment areas: one at the WCU office (1.98253 N; 157.47335 E) on 10 November and two at Erita's Tebaia Lodge (1.98333 N; 157.47334 E) on 11 November. Coordinated surveys are needed further afield at Ronton (using Noni and lures) to determine if eradication is feasible, while surveillance is needed at the key seabird breeding motu. A new environmental license will likely be required from MELAD in Tarawa for application of Antoff/Fipronil, including emergency responses at motu.



Fig 6.1 – Ataiea, Etita and Jason examining Noni flowers on YCA survey at Ronton.

## 7.0 BIOSECURITY

### Kiritimati Biosecurity

Susanna Ratu (Biosecurity Team Leader) provided a clear overview of biosecurity process and issues, and we then joined her for a visit to the Kiribati Port Authority (KPA) and the adjacent copra warehouse. The latter is a secure brick warehouse and there was no sign of invasive ants (except the expected *Pheidole megacephala*) around the perimeter and on a Noni bush. The wharf and copra warehouse still receive copra from Tabuaeran, a known YCA site and probable source of the initial incursion (Pierce et al 2019).

At the KPA terminal Susanna indicated that all incoming containers are checked, and all ships are boarded for inspections as part of the landing party. However, we discussed the general lack of resources available to help her team with some biosecurity tasks, a problem that is essentially unchanged from the past. In addition, rat bait stations are no longer maintained on domestic vessels that travel TRW-CXI via Kanton in the PIPA. Key biosecurity issues identified, and some possible solutions were discussed and these are identified below: Update with Susanna info.

Table 7.1 – Some Biosecurity Issues and Possible Solutions for Kiritimati.

Issues	Recommended solutions
Domestic vessels Tarawa-PIPA-CXI return no longer use rat bat stations, and nor does the Fiji based freighter.	<ul style="list-style-type: none"> <li>Reinstate bait stations on the 3 regular domestic and trading vessels urgently (needs to be led by Biosecurity TRW/CXI), checked and replenished at Kanton if needed. Bait blocks are currently available at CXI, bait stations will be added to next shipment from NZ.</li> </ul>
Few trained staff including for ant ID	<ul style="list-style-type: none"> <li>Further general training via PRISMSS, i.e., via Pacific Biosecurity/SPREP</li> </ul>
Increased biosecurity pressure currently due to return of fishing fleets to eastern Pacific waters for El Nino fishing period	<ul style="list-style-type: none"> <li>Training as above;</li> <li>Discuss with Director, potential staff secondment from Tarawa</li> </ul>
Still no quarantine shed at KPA	<ul style="list-style-type: none"> <li>Raise the need via PRISMS</li> </ul>
Basic equipment sometimes lacking, e.g., headlamps (for checking containers), hand microscope (one and room is available at WCU), hand lenses, bags, vials, specimen box, etc.	<ul style="list-style-type: none"> <li>Biopama can provide small items next trip</li> <li>Ensure other lists of needs are met by Tarawa and/or PRISMS</li> </ul>
No resources for surveillance at KPA and at other risky sites, e.g., copra warehouse. Also, the absence of any working vehicle (motorbikes or ute) making the ability to access the area (or anywhere else where there may be a biosecurity concern) in a timely way difficult	<ul style="list-style-type: none"> <li>Training this trip and ongoing</li> <li>Regular surveillance set up e.g., ant lures around shed, rat bait stations and/or traps at KPA compound, observations for invasives on wharf copra unloading area.</li> <li>Vehicle availability needs addressing urgently.</li> </ul>

### Motu biosecurity

The current vessel used for visits to Motu Upua and Cook Islet is clean and easy to check for stowaways. The presence of Kimoa, mice and Black rats, YCAs and Lantana near the departure site at Ronton means that special care needs to be taken, and all items taken aboard thoroughly inspected. Staff routinely check for rat and cat sign during each visit ashore. A recent cat alert at Cook Islet was followed up with a rapid response by WCU field staff who were able to determine that this was a false alarm. Motu Tapu and Cook Islet should be checked for YCA 1-2 x annually, using 10 m spaced lures (sugar and protein) at and above the landing sites. Staff are trained in YCA recognition and the use of Noni and lures, but during this trip some new staff were trained in survey and species recognition.

## 8.0 BOKIKOKIKO

### Population

During the current visit, Bokikokiko were seen from near main Camp to Tibo lagoon, including near the Cemetery, Kammaraki transect line, beside NE Manulu and Manulu Lagoons, mid Carver Way, beside Nimroona and Tonga-Fred Lagoons and at Tibo Channel. WCU's most recent monitoring of Kammaraki showed encouraging results (K Taabu pers, comm., Pierce et al. 2023). However, it is alarming that birds have been completely lost from the Crystal Beach monitoring lines where zero birds were recorded on the last WCU monitoring in 2018, and zero during the current visit using playback surveys along the 4 km CB transect (RP pers. obs.). There are clear issues with habitat deterioration and potentially the ongoing presence of *Rattus rattus* in this Crystal Beach area. Meanwhile much habitat continues to be lost due to fire, development and especially the rapid spread of weeds, such as *Casuarina* (see below), collectively demanding an urgent response for this declining species (refer recommendations).



Fig 8 – Healthy Te Mao and Te Ren stands are crucial for Bokikokiko survival and a Kammaraki fire (right) has devastated the area around station 1 of the Kammaraki transect.

Concerns re the threat of *Casuarina equisetifolia* to Bokikokiko and other species' habitats have been raised for decades (Clark 1991, Pierce et al. 2007), but no management action has yet transpired. Trees were originally planted at Main Camp in 1975 (J Bridon pers. comm.), and although there has been some recent drought-induced local mortality of *Casuarina*, the spread of this weed has accelerated overall and is now forming tall canopy forest in former Bokikokiko habitat in the Main Camp area and beyond. It continues to advance downwind into the water catchment area, and there are growing infestations elsewhere on the island including in the Poland area and Tabwakea. Water researchers from Griffith University and ACT, Australia, did not seem very concerned re *Casuarina* "unless it invades the lens area", but this invasion now appears to be imminent. Adding concerns for water loss to Bokikokiko habitat loss would be helpful in generating momentum to finally halt the spread of *Casuarina* at Kiritimati.

#### Bokikokiko equipment

Monitoring equipment on hand includes a player and tape that has been used for mid-year monitoring over the past c.10 years, and a UP3 player and card which has not been used due to a missing charger. We resolved to continue use of tape and player for the interim including 2024.

## 9.0 OTHER MATTERS

#### Increased human activity in the Central Lagoons

Markedly increased human activity is now occurring in the central lagoons area, the level of which is unprecedented in the last 50 years. This includes vehicles and especially motorbikes being used to access fishing areas. Significant poaching is clearly happening again especially on the more accessible motu, like the several Nimroona motu, and needs to be addressed via law enforcement training and improved resourcing. For example, during this 2 weeks, and the previous 2-3 months or more, all WCU road vehicles were broken down.

#### A new port planned?

There are rumours of the future construction of a new port in Vaskess Bay near Poland. If it proceeded, it could severely impact several endangered species at Kiritimati. For example, one of only two Green Turtle breeding areas on Kiritimati is at Vaskess Bay. The evening return of Phoenix Petrels, Polynesian Storm-petrel and some other seabirds includes heavy use of Vaskess Bay, with potentially severe mortality caused by port lighting at night. Increased road construction and subsequent use would also have serious implications for the delicate (and protected) central lagoons ecosystem. The status of such a proposal needs confirming, and appropriately skilled input provided at an early stage of any AEE process.

#### Storm surges and erosion

There is little discernible impact from sea-level rise and storms at Kiritimati. A local resident of 55 years, John Bridon, has indicated unchanged sea-levels during this period, and except for some Motu Tabu erosion, I have seen no impacts since 2007. Vegetation in storm-ravaged areas (Kammaraki and some Tanguoua motu) occurred in the 2010s but has recovered. This apparently anomalous situation contrasts with the situation further west, likely assisted by Coriolis effects.

## 10. FOLLOW-UP ACTIONS NEEDED

Recommended actions are consistent with those of the draft integrated management strategy and action plan for Kiritimati (Pierce et al. 2023). Specific short- and medium-term actions are detailed below along with recommended implementation.

#### Kimoa

- Kimoa bait - order sufficient bait for <25 ha Motu Upua and 6 ha Tenei Rababa, plus contingency/emergency) from Pestoff/Orillion Ltd and ship to Kiritimati by May 2024, keep in secure lock up (SC, WCU) (see precautionary notes Section 3).
- Motu Upua Kimoa - extend current rat baiting permit to include Motu Upua in July/August 2024 (Ata/Mika/Steve).

#### Feral cats

- Bring SA traps in next shipment from New Zealand for WCU to trial at Big Peninsula (Steve, WCU).
- Resolve shotgun issue – permitting (WCU) and potentially importing new gun (Steve).

#### Yellow Crazy Ant

- YCA motu biosecurity – given the persistence of YCA at Ronton, implement immediate checks of all vessels departing to Motu Tabu, Motu Upua and Cook Islet (and Drum, Nimroona, etc in central lagoons), checking for sign of colonies/eggs etc on vessels, equipment (WCU).
- YCA motu surveillance – undertake luring for YCA urgently and annually thereafter at Motu Tabu, Motu Upua and Cook Islet landing areas and other frequently visited motu e.g., SW Nimroona. If detected implement EDRR as per rodent/cat sign. (WCU).
- YCA Ronton delineation – we need to determine whether YCA eradication at CXI is feasible or if we just accept that it is established. Eradication is preferable as it takes pressure off vulnerable seabird motu, etc., but we need to determine the true extent of YCA at Ronton (and beyond) to determine if eradication is actually achievable. Therefore, best to undertake coordinated survey of wider Ronton areas for YCA - target entry points, supply/copra warehouses and original infestation – use Noni and lures (WCU).
- YCA bait and license for suppression – determine process for getting environment license and bait and implement (WCU/regional agencies).

#### Quarantine Division resources

- Quarantine Division needs extra support as it is still struggling to secure basic resources to do their job (see details in Section 7). (TRW/Agencies)

#### Seabird monitoring

- Te Bwebwe ni Marawa checks – updates needed for a few sites listed in Appendices 1, 4 (e.g. Ava Lagoon and South Manulu not visited this survey) and share with stakeholders (MELAD, Ray, Steve) for updating a new version of the monitoring plan (WCU/Ray).
- Te Ruru fly-ons – complete evening fly-ons at Motu Tabu, Motu Upua (and Cook Islet if possible) in November 2023; also again in July-August 2024 with Ray to compare seasonally with November 2023;

- Te Taake, a main poaching target – count breeding pairs on key central lagoons motu in August 2024, and compare with results of Pierce et al. 2007. Complete the data sheets (Appendix 2, 4) and share with MELAD, Ray and Steve (Ray/WCU).

#### General

- Print and bind two copies of previous reports and plans for the WCU office, including monitoring plans and this report, and print many data sheets (RP).
- Update Kiritimati monitoring document (Pierce et al. 2018) incorporating latest WCU Bokikokiko data and current 2023 motu and seabird data, and call the updated version, Version 3 (RP).
- Vehicle maintenance – 4WD and motorbikes – maintain roadworthy fleet continuously – there needs to be a budget for this within MELAD/LINNIX and ideally assign staff members to maintenance and inventory of accessory needs. Alert external supporters to any of these specific needs (e.g. small parts, potentially larger parts if bulk material likebait is coming) that can be brought in during visits (WCU, MELAD).
- Equipment maintenance – keep sensitive equipment (cameras, binoculars, microscopes, radios, etc.) properly housed and in secure air-conditioned cupboard or cool room. Best assign staff to the ongoing care and maintenance of individual equipment as per motorbikes (WCU, MELAD).

#### Important medium-term needs

- Turn existing peninsulas accessed by cats and rats into islands via simple excavation at their bases, after which cat and rat eradication can occur and be sustained, and poacher access minimized. The prime candidate is Big Peninsula (Pierce et al. 2012), but others such as East Drum, the isthmus between SW and Big Nimroona (by explosives/shovel) and the central isthmus at Nimroona Lagoon should also be excavated at both ends (excavator), and the SW Nimroona channel deepened and widened by excavator. If excavation is not feasible, consider fence barriers and bait stations, but these would be much less effective than moats. Apply for environmental license (WCU/Ray/Steve).
- Te Bwebwe ni Marawa - repeat evening motu fly-ons every 5 years, or earlier if concerns arise and opportunistically for remote motu (WCU/Ray)
- Te Ruru – Next year (2014) complete evening fly-ons in November 2024 (El Nino year) and include the 12 top motu as per Monitoring Plan - Motu Tabu, Motu Upua, Big Drum, NW Nimroona, Big Nimroona, Big S Nimroona, Iareto, Big Ambo, Big Tonga-Fred, Poland a and b), thereafter every 5 years as per Te Bwebwe ni Marawa unless concerns arise. (WCU)
- Seabirds – if possible, establish relative importance of mid-year and end-of-year breeding pulses for Te Ruru, Te Bwebwe ni Marawa and other species (researchers if possible).
- Bokikokiko monitoring – monitor Kammaraki (stronghold), Bathing Lagoon and Tanguoua lines in June 2024, and share and update data. (WCU/Ray)
- Bokikokiko back-up population – given declines on Kiritimati, there needs to be a 2<sup>nd</sup> population established on rat-free and cat-free Palmyra in the near future. The birds in the new population could be reintroduced to Kiritimati if needed in the future (VanderWerf and Pierce 2019). Motu Upua should be used as a trial translocation motu once rat eradication is confirmed there (projected to be in 2025). (MELAD/Vanderwerf)
- Address weed impacts on Kiritimati, particularly *Casuarina*, but also *Pluchea* and

- Lantana* (MELAD/regional agencies/specialists).
- Check status and details of new port proposal and address accordingly (MELAD/regional agencies).
  - Publish population trends of Te Ruru and Te Bwebwe ni Marawa and some other species 2007-24 (Katareti/Ray).
  - Arrange a repeat law enforcement training programme in situ at Kiritimati (i.e. not workshopped elsewhere). (Regional agencies/Ross Atkinson).

## ACKNOWLEDGEMENTS

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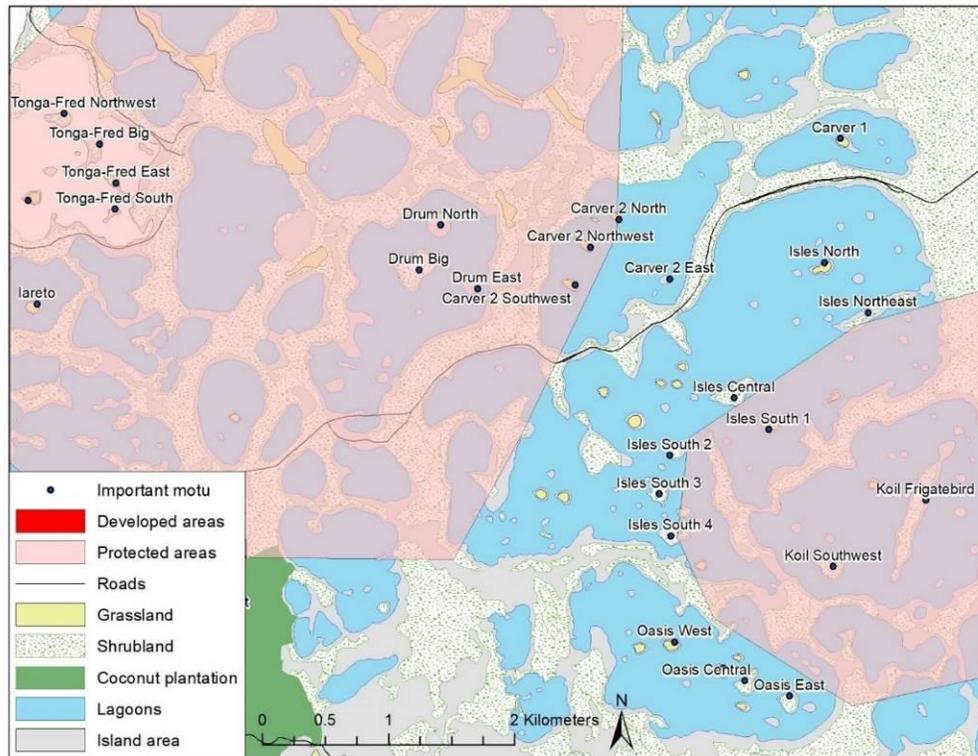
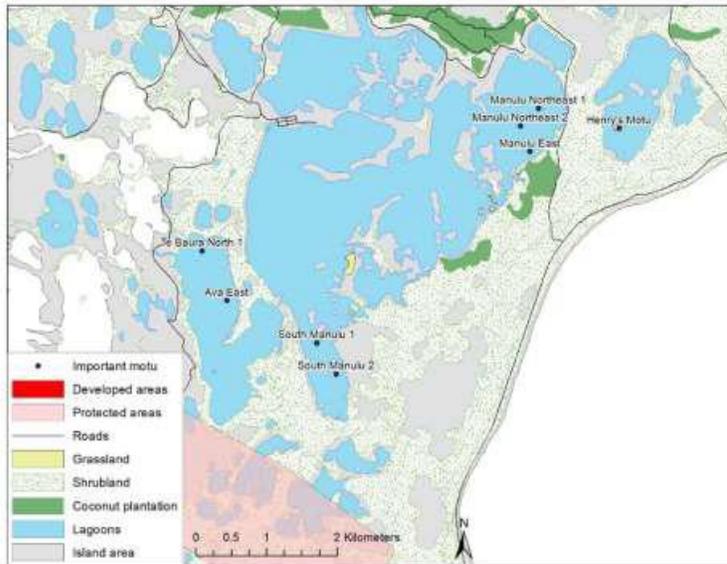
## APPENDIX 1 – DRAFT SUMMARY OF IMPORTANT SEABIRD MOTU AT KIRITIMATI - LOCATIONS, AREAS, KEY BIRDS AND PESTS 2009-2023.

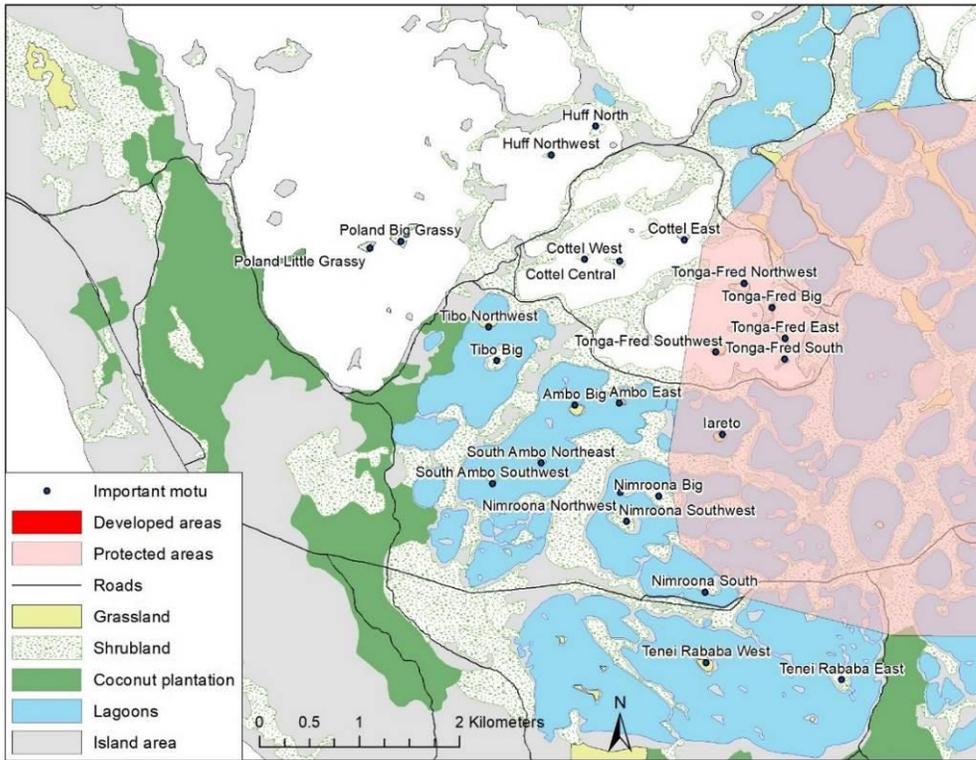
Note: For “Key birds” TR = Te Ruru, TB = Te Bwebwe ni Marawa, TA = Tanguoua, TE = Te Etei, + = plus other species, ++ = plus many other species. GPS degree coordinates are all -1 and +157. Asterisk\* indicate sites that need confirmation of land areas and/or species. References are: 1. Pierce et al. 2007; 2 Pierce and Brown 2009, 3. Pierce 2012a; 4. Pierce et al. 2012 (revised 2018); 5. Pierce et al. 2023 (draft); 6. Taabu et al WCU 2023 surveys; 7. Appendix 2 of this document.

Three location maps follow this appendix.

Lagoon	Motu name	ha	GPS location	Key birds 2009	Key birds Nov 2023	Pest status 2009	Pest status 2023	Refs
Main	Motu Tabu	3-4*	1.9717; 157.4317	TR TB TA ++	TR TB TA ++	None	None	1, 4, 6
	Cook Islet	23*	1.9559; 157.4814	TR ++	TR ++	None	None	1, 4, 6
	Motu Upua	25*	1.9984; 157.4500	TR TA ++	TR TA	Kimoa	Kimoa	1, 4, 7
East Manulu	Henry’s	0.75	1.9528; 157.3255	TR TB +	TR TB, +	None	Infer none	1, 4
Manulu	North-east 1	<1	1.9565; 157.3338	TB	TB	Infer none	Infer none	1, 4
	North-east 2	<1	1.9554; 157.3358	TB	TB	Infer none	Infer none	1, 4
	East	<1	1.9500; 157.3369	TB	TB	Infer none	Infer none	1, 4
South Manulu	South 1	<1	1.9261; 157.3636	TB		Infer none		4
	South 2	<1	1.9212; 157.3618	TB		Infer none		4
Te Baura	North 1	<1	1.9372; 157.3792	TB		Infer none		4
	North 2	<1	1.9559; 157.4814	TB*		Infer none		4
Ava	East	<1	1.9309; 157.3755	TB*		Infer none		4
Carver 1	Carver 1	<1	1.8475; 157.3616	TB	TB	None	Infer none	1, 4, 6
Carver 2	East	<1	1.8378; 157.3745	TB	TB	None	Infer none	1, 4, 6
	North	<1	1.8424; 157.3779	TB	TB	None	Infer none	1, 4, 6
	North-west	<1	1.8401; 157.3799	TB	TB	None	Infer none	1, 4, 6
	South-west	<1	1.8374; 157.3810	TB	TB	None	Infer none	1, 4, 6
Drum	North	2.5	1.8417; 157.3904	TR	TR	Baited 2009	No rats 2023	1 2 4 6
	Big	6.1	1.8386; 157.3921	TR TA ++	TR ++	Rats 2009	No rats 2023	1 2 4 6
	East	1.0	1.8374; 157.3881	TR +	??	Cat/rat access	Cat/rat visit	1, 2, 4
Iareto	Iareto	1*	1.8358; 157.4194	TR TB, ++	TR TB +	None		1, 2, 4
Nimroona	Big	6.5	1.8302; 157.4244	TR TB TA++	TR TA ++	Rats baited 2009, back 2017	Rats baited	1, 2, 4
	South-west	3.9	1.8282; 157.4278	TR TB TA ++	TR TA, ++	Rats baited 2009, back 2017	Rats baited	1, 2, 4
	Little Big N (North-west)	0.6	1.8309; 157.4278	TR	TR	Rats baited 2009, back 2017?	Rats baited	1, 2, 4
	South	1*	1.8222; 157.4205	TR ++	TR TB ++	Rats baited 2010	Infer none	1, 2, 4
Ambo	East	<1	1.8389; 157.4282	TR +	TR TB	Unknown	Infer none	1, 2, 4
	Big	1.4	1.8382; 157.4322	TR ++	TR TB ++	Rats baited 2009	Infer none	1, 2, 4
	North-west	<1	1.8399; 157.4333	TR ++	TR TB ++	Rats baited	Infer none	1, 2, 4

						2009		
<b>South Ambo</b>	North-east	<1	1.8336; 157.4353	TB	TR TB +	Infer none	Infer none	1, 2, 4
	South-west	<1	1.8321; 157.4398	TB	TR TB +	Infer none	Infer none	1, 2, 4
<b>Tibo</b>	Big	3.4	1.8428; 157.4393	TR ++	TR TB +	Rats baited 2012	Infer none	1, 2, 4
	North-west	<1	1.8461; 157.4401	TR +	TR TB	Rats baited 2009	Infer none	1, 2, 4
<b>Poland Ch</b>	Big Grassy	2*	1.8536; 157.4479	TR TB, ++	TR TB ++	None 2011	Infer none	3,4
	Little Grassy	1*	1.8530; 157.4510	TR TB, ++	TR TB +	None 2011	Infer none	3, 4
<b>Tonga-Fred</b>	Big	3.5	1.8476; 157.4149	TR ++	TR ++	Rats baited 2009	To visit 2023	2, 3, 4
	East	0.8	1.8446; 157.4137	TR +	TR ++	Rats baited 2009	To visit 2023	2, 3, 4
	North-west	1.3	1.8494; 157.4172	TR +	TR	Rat and cat access	Infer rats +/- cat present	2, 3, 4
	South	<1	1.8426; 157.4135	TR TB	?	Infer none 2009	?	2, 3, 4
	South-west	<1	1.8434; 157.4194	TR +	?	Rats baited 2009	?	2, 3, 4
<b>Cottell</b>	East	<1	1.8539; 157.4227	TR TB	?	Infer none 2010	?	4
	Central	<1	1.8517; 157.4287	TR +	?	Unknown	?	4
	West	<1	1.8521; 157.4315	TR +	TR +	Unknown	Infer rats	4
<b>Huff</b>	North	<1	1.8636; 157.4304	TR +	?	Unknown	?	4
	North-west	<1	1.8612; 157.4338	TR +	?	Unknown	?	4
<b>Koil</b>	Frigatebird	10*	1.8217; 157.3564	TR TE, ++	TR TB TE ++	Rats baited 2011	Infer none	3, 4
	South-west	3	1.8172; 157.3623	TR+	TR xxxx	Rats baited 2009	Infer none	2, 4
<b>Isles</b>	North	<1	1.8386; 157.3628	+	X	Rats baited 2009		2, 4
	North-east	1.4	1.8353; 157.3597	TR ++	X	Rats baited 2009		2, 4
	Central	4.1	1.8294; 157.3692	TR ++	X	Rats baited 2009		2, 4
	South 1	1-2	1.8274; 157.3765	TR +		Rats baited 2009		2, 4
	South 2	1-2	1.8255; 157.3737	TR +		Rats baited 2009		2, 4
	South 3	1-2	1.8222; 157.3749	TR +		Rats baited 2009		2, 4
	South 4	1-2	1.8195; 157.3741	TR +		Rats baited 2009		2, 4
	West multiple motu	<1	Beside Carver 2	?	TR TB +	Infer none	Infer none	2, 4
<b>Oasis</b>	East	1-2	1.8073; 157.3656	TR ++	TR ++	Rats baited 2012	None 2023	4, 6
	Central	1-2	1.8085; 157.3687	TR ++	TR ++	Rats baited 2012	None 2023	4, 6
	Central-west	1	1.8098; 157.3706	TR ++	TR ++	Rats baited 2012	None 2023	4, 6
	West	1	1.8117; 157.3739	TR +		Infer rats	Infer rats	4, 6
<b>Tenei Rababa</b>	East	1.3	1.8136; 157.4084	TR +	Nil	Unknown	Infer rats +	4, 5
	West (2)	4.5	1.8152; 157.4206	TR +	Unknown	Unknown	Infer rats	4, 5





## APPENDIX 2 – RESULTS OF MOTU FAUNA SURVEYS

Data collected during motu surveys						
Lagoon	Main	Koil	Tonga-Fred	Tonga-Fred	East Ambo	Drum
Motu	Motu Upua	Frigatebird	Big T-Fred	Big, East	Iareto	Big Drum
Area (ha)	23+	8	3.5	0.8	<1	6.1
Date	2/11/23	11/11/23	11/11/23	13/11/23	8/11/23	19/4/23
Time	0730-0840	1500-1510	1600-1610		1744-50	1228-1357
Observers	SC KT RP	KT RP	KT RP	BK KK	RP	KT TT
Kimoa/rat sign	Yes	None inferred	None inferred	None	None inferred	No
Cat sign	No	None inferred	None inferred	None	None inferred	No
Poaching	No	?	?	None? KK?	?	No
Te Ruru	10+ Br	P	P 30+ Br	P	36-80	P
Te Tanguoua	50+ Br					P
Te Tinebu						
Te N'na				P		
Te Bwebwe					1	
Te Taake			P			
Te Mouakena		P	1			
Te Kibwi		P	5+ Br			P Br
Te Koota	1	20+	300+ Br			P Br
Te Eitei area/Great						P
Te Eitei rangi		300+ Br				
Te Karakara						
Tarangongo		30+			30+ Br	P Br
Te Keeu						
Te Io	40+	50+			20+	P Br
Te Mangakiri	200+ Br					P Br
Te Raurau	8	20+			10+	
Te Matawa	100+ Br					P Br
Te Kewe	c.20					
Bokikokiko						
Skink	1					

Key: P = present – not counted, Numbers = pairs (p) or individuals (i), J = juvenile, F = flying overhead; Br = breeding  
 Observers: Steve Cranwell, Ray Pierce, Katareti Taabu, Bauro Kambeia, Kautabuki Kamwatie, Tekake T.

**Motu Upua Notes:**  
 Te Ren some of the healthiest seen on CXI  
 Fledgling Te Ruru x 2; Tanguoua many chicks, Te Raurau prospecting in same area as in 2007.  
 Also c.40 Pacific Golden Plovers, 5 Turnstones and 3 Wandering Tattlers.

Big Drum notes: Te Ren dying. N Drum also surveyed for no Kimoa, no poaching.

NIMROONA LAGOON					
Lagoon	Nimroona	Nimroona	Nimroona	S Nimroona	S Nimroona
Motu	SW Nimroona	Big Nimroona	Little NW Nim	Big South Nim	Little S Nim
Area (ha)	3.9	6.5	0.6	c.1	<1
Date	7/11/23	7/11/23		8&11/11/23	8&11/11/23
Time	0930-1530	0930-1530		1700+	1700+
Observers	SC KT RO B			RP KT	RP KT
Kimoa/rat sign	Yes	Yes		Infer No	Infer No
Cat sign	No	No		Infer No	Infer No
Poaching	No	Yes old, 20+ boobies, c10 frigatebirds, 2 Te Taake		?	?
Te Ruru	200 flying 1530, 200+ evening Br	480+ flying 1530, 900+ evening	<20 Br	58-90 Br	
Te Tanguoua	Est 100s Br	Est 100s Br			
Te Tinebu	5	20+ Br			
Te N'na					
Te Bwebwe					
Te Taake	2	6+ Br chicks			
Te Mouakena					
Te Kibwi		1			
Te Koota	Deserted	30+ Br chicks			
Te Eitei area/Great		c. 10 Br chicks	P		
Te Eitei rangi					
Te Karakara					
Tarangongo		10+ Br nests, 10 ch			
Te Keeu					
Te Io		10+			
Te Mangakiri	10+ Br	30+ Br			
Te Raurau	2		P		
Te Matawa	c.10	c. 10 Br			
Te Kewe					
Bokikokiko	0	0			
Skink					

**Key:** P = present – not counted, Numbers = pairs (p) or individuals (i), J = juvenile, F = flying overhead; Br = breeding

Observers: Steve Cranwell, Ray Pierce, Katareti Taabu, Bauro Kambeia, Kautabuki Kamwatie

#### SW and Big Nimroona Notes

Te Ruru heavily prospecting, some eggs (see fly-on counts). Te Tanguoua chicks.

First baiting 7-8/11/23, 2<sup>nd</sup> baiting and bait stations 13/11/23

#### SW and Big Nimroona actions needed

1. Maintain bait stations for reinvading rats, check for rats through motu
2. Maintain surveillance for poaching

AMBO-TIBO LAGOONS					
Lagoon	Ambo	Ambo	Ambo	Tibo	Tibo
Motu	Big Ambo	NW Ambo	E Ambo	Big Tibo	NW Tibo
Area (ha)	1.4	<1	<1	3.8	0.8
Date	11/11/23	11/11/23	11/11/23	11/11/23	11/11/23
Time	1700-1830	1820	1800?		
Observers	KT, RP	RP	KT	RP	RP
Kimoa/rat sign	None inferred				
Cat sign	None inferred				
Poaching	?	?	?	None inferred	None inferred
Te Ruru	55+ circle Br	65 circle	Xxx	65+	9
Te Tanguoua	?				
Te Tinebu	?				
Te N'na	5+				
Te Bwebwe		1 landed			
Te Taake					
Te Mouakena					
Te Kibwi	2			3+ Br	3+ Br
Te Koota	20+			200+ Br	40 Br
Te Eitei area/Great					
Te Eitei rangi					
Te Karakara					
Tarangongo	P			c.100 Br	
Te Keeu					
Te Io		20+		c.50	4
Te Mangakiri	P				
Te Raurau	P	20+		20+	3
Te Matawa					
Te Kewe					
Bokikokiko					
Skink					

All motu observed from mainland, none visited.  
 Dieback of Te Ren evident Big Ambo and Big Tibo  
 One Te Kewe on mainland crab area Tibo Channel.

APPENDIX 3 -TE BWEBWE NI MARAWA EVENING COUNTS IN 2023

Lagoon/Motu	Date	Time	Observers	TBNM feeding around motu	TBNM land/hover on motu?
Big Ambo	8/11/23	1728-30	RP	1	Yes. One hover E end grasses.
NW Ambo	8/11/23	1728-32	RP	1+	Yes, 1
S Ambo NE	8/11/23	1727-32	RP	3+	No, one flew over motu
S Ambo	8/11/23	1727-32	RP	1	Too far off
Iareto	8/11/23	1744-47	RP	3+	Yes, 1 landed
Carver 4	8/11/23	1815-17	RP	1	Yes, 1 landed. = unnamed lagoon and motu 500 m W of Drum
Isles Lagoon – motu opp E end Carver 2	8/11/23	1828	RP	2	Yes, 1 landed, flew again
Isles Lagoon - 3 motu opp mid Carver 2	8/11/23	1832	RP	2+	Yes, 1 hovering at motu
S Drum Lagoon	9/11/23	1820-40	BK KK RP	6+	Yes, one landed Little Big Drum
Ambo Lagoon	11/11/23	1730-1830	KT	20+	No
Tibo Lagoon	11/11/23	1720-1735	RP	2	No
Poland Channel	11/11/23	1740-1800	RP	4	No, but feed close to 2 x Poland motu
Cottell Lagoon	11/11/23	1805-15	RP	2	No – no view of the small Cottell motu
Manulu NE1	12/11/23	1745-1800	RP	1	Yes, 1 hovered over motu
Manulu NE2	12/11/23	1745-1800	RP	4	Yes, 2 landed
Manulu E motu	12/11/23	1725-1740	RP	1	Yes, 1 hovered, landed 1729, video
Manulu E tiny	12/11/23	1725-1740	RP	2	Yes, 1 landed 1740, new site
NE Manulu/Henry's	12/11/23	1812-30	RP	4	Yes, 2-3 landed
Frigatebird	13/11/23	1800-20	RP	2	Yes
SW Koil	13/11/23	1800-20	RP	1	Yes

Other species flying on in evening included multiple Tropical Shearwaters and Brown Boobies to each of Big Nimroona, Big Drum, Big Tonga-Fred, Big Ambo, Big Tibo and Frigatebird (Koil).

## APPENDIX 4 – LIST OF KEY KIRITIMATI BIOTA

### A. BIRDS

Species	Kiribati name	English name
<i>Pterodroma alba</i>	Te Ruru	Phoenix Petrel
<i>Puffinus (Ardenna) pacifica</i>	Te Tanguoua	Wedge-tailed Shearwater
<i>Puffinus nativitatis</i>	Te Tinebu	Christmas Shearwater
<i>Puffinus tropica</i>	Te N'na	Tropical Shearwater
<i>Nesofregatta fuliginosa</i>	Te Bwebwe Ni Marawa	White-throated storm-petrel
<i>Phaethon rubricauda</i>	Te Taake	Red-tailed Tropicbird
<i>Phaethon lepturus</i>	Te Ngutu	White-tailed Tropicbird
<i>Sula dactylatra</i>	Te Mouakena	Masked Booby
<i>Sula leucogaster</i>	Te Kibwi	Brown Booby
<i>Sula sula</i>	Te Koota	Red-footed Booby
<i>Fregata minor</i>	Te Eitei Are e Bubura	Great Frigatebird
<i>Fregata ariel</i>	Te Eitei Are e Aki Rangi Ni Bubura	Lesser Frigatebird
<i>Pluvialis fulva</i>	Te Kun	Pacific Golden Plover
<i>Numenius tahitiensis</i>	Te Kewe	Bristle-thighed Curlew
<i>Heteroscelus incanus</i>	Te Kirikiri	Wandering Tattler
<i>Arenaria interpres</i>	Te Kitibwa	Ruddy Turnstone
<i>Sterna bergii</i>	Te Karakara	Great Crested Tern
<i>Sterna lunata</i>	Te Tarangongo	Grey-backed Tern
<i>Sterna fuscata</i>	Te Keeu	Sooty Tern
<i>Anous stolidus</i>	Te lo	Brown Noddy
<i>Anous minutus</i>	Te Mangakiri	Black Noddy
<i>Procelsterna cerulea</i>	Te Raurau	Blue Noddy
<i>Gygis alba</i>	Te Matawa	White Tern
<i>Vini kuhlii</i>	Te Kura	Rimatara (Kuhl's) Lorikeet
<i>Acrocephalus aequinoctialis</i>	Te Bokikokiko	Christmas Island Warbler

### B. OTHER KEY ANIMALS INCLUDING POTENTIAL INVADERS

Species	Kiribati name	English name
<i>Anoplolepis gracilipes</i>	Te Kinongo	Yellow crazy ant
<i>Cardisoma</i>	Te Manai	Cardisoma Crab
<i>Tilapia</i>	Baneawa	Milkfish
<i>Chelonia mydas</i>	On	Green Turtle
<i>Felix catus</i>	Katamwa	Feral House Cat
<i>Herpestes auropunctatus</i>		Grey Mongoose
<i>Mus musculus</i>		House Mouse
<i>Rattus exulans</i>	Kimoa	Pacific Rat
<i>Rattus rattus</i>	Kimoan te Kaibuke	Black or Ship Rat
<i>Rattus norvegicus</i>		Brown Rat

## C. PLANTS

Species	Kiribati name	English name
<i>Boerhavia</i> spp.	Te Wao	
<i>Cassytha filiformis</i>	Te Ntanini	Love-vine
<i>Casuarina equisetifolia</i>	Te Burukam	Ironwood
<i>Cocos nucifera</i>	Te Ni	Coconut
<i>Cordia subcordata</i>	Te Kanawa	Beach Cordia
<i>Heliotropium procumbens</i>		Beach Heliotrope
<i>Ipomoea littoralis</i>	Te Ruku	Morning Glory
<i>Lantana camara</i>	Te Kaibuaka	Lantana
<i>Lepturus repens</i>	Te Utuete	Thintail
<i>Morinda citrifolia</i>	Te Noni	Noni, Cheese Fruit
<i>Pandanus tectorius</i>	Te Kaina	Pandanus
<i>Pisonia grandis</i>	Te Puka	Pisonia
<i>Pluchea odorata</i>	Te Aronga	Sour Bush
<i>Scaevola taccada</i>	Te Mao	Saltbush, Beach Cabbage
<i>Sesuvium portulacastrum</i>	Te Boi	
<i>Sida fallax</i>	Te Kaura	Golden Mallow
<i>Suriana maritima</i>	Te Aroua	Bay Cedar
<i>Tournefortia argentea</i>	Te Ren	Heliotrope
<i>Tribulus cistoides</i>	Te Maukinikin	Puncture Vine